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Rep. Chief Eng. U.S. Army, 1877. 645 Cong. 3d
 Sess.; House Ex. Doc. no. 12
 APPENDIX Q Q. See p. 1681

1878

ANNUAL REPORT OF LIEUTENANT EDWARD MAGUIRE,
 CORPS OF ENGINEERS, FOR THE FISCAL YEAR ENDING
 JUNE 30, 1878.

EXPLORATIONS AND SURVEYS IN THE DEPARTMENT OF DAKOTA.

HEADQUARTERS DEPARTMENT OF DAKOTA,
 CHIEF ENGINEER'S OFFICE,
 Fort Snelling, Minn., July 18, 1878.

GENERAL: I have the honor to submit the following report for the fiscal year ending June 30, 1878.

The engineer detail in this department at the close of the last fiscal year consisted of myself as engineer officer and a detachment of the battalion of engineers composed of one sergeant and three privates.

By Special Orders No. 165, Headquarters Department of Dakota, November 30, 1877, Private Julius J. Durage, sergeant-major Eleventh Infantry, was transferred to the general service as topographical assistant and reported for duty at this office December 28, 1877.

In the spring of 1877, his recommendation having been approved, the Quartermaster-General set aside the sum of \$10,000 from the appropriation for the transportation of the Army for the improvement of the Yellowstone River. As engineer officer of this department I was assigned to the charge of the work; Lieut. W. H. Low, Twentieth Infantry, was detailed as assistant. Lieutenant Low, with the sergeant and one private of the engineer detachment left this city May 14, 1877, to make a survey of the reservation at Tongue River. A partial survey was made, but they were relieved from that duty to carry on the work of improvement at Wolf Rapids.

I left Bismarek, Dak., July 4, with one private of engineers and ten civilians, for Wolf Rapids. Having started the work, and Lieutenant Low having reported, I returned to Saint Paul to make necessary disbursements. On the 3d of August I left Saint Paul to visit the party engaged upon the improvement of the Missouri River at Dauphin's Rapids.

I was detained at Cow Island for three weeks through lack of transportation, and the two steamboats on which I attempted to descend the river were successively stopped by General Howard and Colonel Miles, who were in pursuit of the Nez Percés. I did not arrive at Fort Buford until the 20th October.

For the reasons noted above, no important topographical work was done by me or the detachment during the year.

As stated in my report for last year, two officers (Lieut. L. R. Hare, Seventh Cavalry, and Lieut. O. F. Long, Fifth Infantry) were detailed as acting engineer officers for the troops in the field. They plotted their notes in this office, and their work was incorporated in the corrected map of the department forwarded to the Chief of Engineers. Their reports will be found appended. Portions of each of these reports refer to sections of the country hitherto officially unknown.

In view of the present excitement over the gold discoveries in the Bear Paw Mountains, Lieutenant Long's report upon that neighborhood will be found interesting.

To Assistant Surgeon V. Havard's report entitled "Botanical Outlines," &c., I would invite special attention.

Upon my application to the department commander, Lieut. William Hoffman, Eleventh Infantry, was ordered to make a thorough reconnaissance of the Moreau River from its mouth to its source. He is now engaged upon this work, having started from Cheyenne Agency April 28, 1878. This reconnaissance will fill up a very important gap.

Unless something unforeseen should prevent, I shall organize at Fort Custer, Mont., an expedition to the Bighorn Mountains and vicinity.

In addition to the ordinary routine work of the office reports have been submitted upon the following subjects, viz:

I. Improvement of the Yellowstone River, with map, for the benefit of Mr. Thomas L. Rosser, chief engineer Northern Pacific Railroad (by order of department commander).

II. Forestry of the department, with map, for the Commissioner of Agriculture (by order of the Chief of Engineers).

III. Report upon certain repairs to be made at Fort Snelling, Minn.

Preparations were also made to observe the transit of Mercury, but in consequence of heavy clouds during the time of contacts no results were obtained.

The topographical assistant, with two of the enlisted men of the engineer detachment, left Saint Paul May 20, 1878, for the purpose of surveying the reservation of Fort Keogh, Mont.

Very respectfully, your obedient servant,

EDW. MAGUIRE,
*First Lieutenant Corps of Engineers,
Chief Engineer Department of Dakota.*

The CHIEF OF ENGINEERS, U. S. A.

1.—REPORT OF LIEUT. L. R. HARE, ACTING ENGINEER OFFICER, OF MARCH OF THE SEVENTH CAVALRY DURING SUMMER AND FALL OF 1877.

SAINT PAUL, MINN., *January 24, 1878.*

SIR: I have the honor to transmit herewith a report of the march made by the Seventh Cavalry, under command of Col. S. D. Sturgis, Seventh Cavalry, during the summer and fall of 1877.

In addition to my report, I inclose a paper by Assistant Surgeon V. Havard, U. S. A., upon the botany of the portion of country passed over by the command, which will be found to contain a list of all the more important species of vegetation found in that country.

I am, sir, very respectfully, your obedient servant,

L. R. HARE,
First Lieutenant of Seventh Cavalry.

Lieut. EDWARD MAGUIRE,
Corps of Engineers, Chief Engineer Department of Dakota.

REPORT.

The command, consisting of eleven companies of the Seventh Cavalry, was encamped the 2d day of May one mile and a half directly east of Fort Lincoln, and on the 3d left this first camp, marching 15.3 miles to Burnt Creek, passing through Bismarek. The road was in good condition, the wagon-train coming into camp soon after the column; Burnt Creek bridged. Wood was found in small quantities about half a mile

from camp; water and grass plenty. On the 4th the march was continued up the Missouri River to Painted Woods Creek, a distance of 12.72 miles. The road is very bad where it descends from the upper table to the river-bottom; the crossings to the small streams were very difficult on account of a heavy rain and hail storm which fell during the day. Wood, water, and grass abundant at camp. Fifth, marched up Missouri 21.6 miles to Dry Coulee, the road leading along the first table above the river-bottom and is very good with the exception of small streams making into main river. These streams are all alkaline, and unless bridged are very difficult to cross with wagons, and sometimes dangerous for horses. After crossing Turtle Creek, passed to high grounds. It was necessary to haul wood for this camp from last point where the road leaves the bottom; plenty of water and grass.

On the 6th, marched to Snake Creek, 18.7 miles, passing from the high lands to bottom.

The road is very good at all seasons of the year, there being but one bad crossing, at Wolf Creek. Drift-wood is obtained here, which is deposited each year when the Missouri River falls; grass tolerable. Snake Creek empties into Missouri 6 miles below Fort Stevenson, 1 mile beyond which post the command camped the next day, on Douglas Creek. Remained in camp the 8th for the purpose of obtaining supplies. Moved from Fort Stevenson on the 9th, camping at Berthold Agency that night. This agency is situated on the banks of the Missouri, 14 miles above Fort Stevenson. It is the agency for the Aricarees and a portion of the Gros Ventres. In the bottom-land just above the agency they have a corn and potato field which is tilled by the squaws. Potatoes yield bountifully, and a ready market is found for them at the agency. They are bought by steamboats and passing commands. The corn is a short stubby growth and the yield light, but is a favorite diet with these Indians, so that they are careful of its cultivation. The road leads along the higher ground, and is very good with the exception of about 2 miles which passes through a strip of "bad land." The grass at the agency is kept continually eaten off by the herds belonging to these Indians. Wood is scarce. From Berthold Agency the command marched on the 10th to L'eau qui Monte (25.81 miles). Six miles above the agency the road leaves the bottom and leads to the high grounds, over which it is always good. Cone Butte (bearing 90° - 94°) lies close to where the Little Missouri joins the main stream. The river on the north side makes a steep cut in the bank, and there is scarcely any bottom along there on the north side. It was found necessary to haul wood 12 miles for this night's camp. Grass very fine, and running water. On the 11th marched to Shell Creek (12.58 miles). Entered the inner bottom 3 miles from camp, about a mile below the Narrows (local name, the Slide). This slide was caused by the river washing under the bank for some distance, the lands afterwards caving in.

The bottom for 3 miles is very bad, and there was considerable difficulty in getting the train through. It was necessary to bridge once and lay about a hundred yards of brush-corduroy besides. Sully's Lake is located at the upper end of the bottom, at which point the road leaves the bottom, from here on being very good.

Shell Creek is a bold, swift little stream, containing large numbers of small white fish. Wood was hauled from the bottom near the Slide; grass plenty. On the 12th it was found necessary to make a detour to the south in order to avoid an alkali flat over which the main trail led. This was rendered impassable by recent rains. By going 4 miles down Shell Creek a good crossing was found, and after this crossing the trail led to a divide, along which a good road was found for 18 miles where it came to the main road. This is about 4 miles longer, but in wet weather the only practicable route. Camp was made at the mouth of Kuipe River (22.36 miles), which is a dull, sluggish alkali stream, not fordable, but its steep-cut banks and narrow channel make it easy to bridge. Wood, water, and grass plentiful. The 13th, marched up river-bottom to Grinnell's wood-yard (18.67 miles). The road along the bottom is very bad in wet weather, the small streams being difficult to cross. The road passes along foot of bluffs after crossing White Earth Creek for 7 miles. The crossing at White Earth Creek is very bad and approaches steep. Timber is convenient for corduroying, which was done and the train passed over in two hours. On the 14th the road continued along the river-bottom for 9 miles, when it leads to high grounds. The bottom part of this road is difficult in wet weather; one alkali stream, 4 miles from camp, had to be bridged; material half a mile distant. Camp was made at Tobacco Garden (13.80 miles), so called from the appearance of the leaves on the bushes after frost in the fall. Plenty of wood, water, and grass. At Tobacco Garden the road leaves the river-bottom, and does not again approach it until within about 8 miles of Fort Buford.

On the 15th camp was made on Stony Creek (22.22 miles). The country is undulating and road is good at all seasons of the year; the crossings are all good, occasioning no delay to the train.

On the 16th the command marched (18.35 miles) to a point on the Missouri River 8 miles below Fort Buford. Crossed Big Muddy 3 miles from camp, the stream at this point having a good gravel-bed, making crossing very good. The road from this point is over a level prairie, and very good. Crossed a small creek at camp which it was necessary to corduroy with material close by. Wood, water, and grass plenty.

On the 17th marched 4 miles above Fort Buford (13.66 miles, day's march), camping in river-bottom opposite the mouth of the Yellowstone. The bottom is almost impassable in wet weather. Grass at camp poor. The command was in camp here until the 19th, when the steamer Far West arrived and ferried it to the south side of Missouri, between the Yellowstone and Missouri. A heavy rain-storm fell this day which completely inundated the bottom, making it necessary to move camp to the high grounds about a mile back.

The country from Fort Abraham Lincoln to Fort Buford along the Missouri is of the same general character, and a description of any part will suffice for all. The soil is sandy alluvial, thoroughly impregnated with alkali, which manifests itself in the water, and also the bottoms and hillsides. The country is underlaid almost entirely by lignite beds, the strata being visible along river-banks and in ravines. The strata on the south and west bank of the river are nearer the surface than on north and east banks. Timber grows only along river-bottoms and ravines and other depressions where the features of the country afford protection against storms and fires.

The prairie fires which pass over the country every fall are the great destroyers of vegetation of more than one year's growth; otherwise, I think this country would in the course of a few years be covered with a growth of trees and shrubs. A command marching through this country during the wet season should be provided always with a bridge-train, for the small alkali streams are found to be the real obstacles to the progress of a command, very often the cavalry having to bridge before crossing. Stringers and cross-pieces with enough plank to lay a bridge for 30 feet would be found of great service, and will suffice for all ordinary crossings. This bridge can be laid flat on the ground, as the approaches are generally good or can be made so with very little work.

From the 19th to the 23d the command remained in camp between Yellowstone and Missouri equipping and enlisting scouts preparatory to the march up the Yellowstone. The valley of the Yellowstone from its mouth to 50 miles above averages about 2 miles in width, and is one of the most beautiful and fertile valleys of this northwestern country. The bottoms near the river are covered with a dense growth of timber, mostly cottonwood, from the outskirts of which a level prairie extends back to the hills which is covered with a luxuriant growth of grass of sufficient height for hay and of a very nutritious quality.

The streams tributary to the Yellowstone along this line are swift-running little rivulets with gravel-beds. They go dry in summer, the water sinking and evaporating before reaching the valley.

The command marched 21.40 miles on the 23d, camping on the bank of the Yellowstone. Forsyth's buttes were in plain sight during the entire day, bearing 324° - 260° .

On the 24th, marched 18.75 miles up valley, the road being very good, with the exception of a mile of alkali flat which was very difficult for wagon-train. The hills gradually approach the farther up stream we move, until they are within half a mile at camp. Camp was made on the bank of the Yellowstone, with plenty of wood, water, and grass.

On the 25th, marched 18.74 miles up Yellowstone, passing through about three-fourths of a mile of very bad alkali flat. Made camp on Muster Creek, near its mouth. The Yellowstone, on opposite bank, cuts into the hills, making the opposite banks very steep and rugged, ranging from 50 feet to 250 feet in height, almost perpendicular. Game was found in abundance, consisting of antelope and black and white tail deer.

On the 26th, marched to Glendive Station (11.47 miles), the road for 7 miles being very bad. The river curves so as to cut into the hills on the north side, so that the road over this portion for 7 miles is very rough. Glendive Butte, or Deer Creek, 3 miles from its mouth, can be seen for 25 miles down the river. Camp was on Deer Creek; plenty of wood, water, and grass; bottom covered with sage-brush. At Glendive the road leaves the bottom, and only again comes back to it above Tongue River. This is a new route, which was laid out by direction of Colonel Miles during the winter of 1876 and 1877. The next camp was made on Clear Creek (20.22 miles). The road was very good, leading over a rolling prairie, the ravines being crossed without difficulty. Drift-wood was found in small quantities; water and grass abundant.

On the 28th, marched 21.66 miles to East Fork of Cedar Creek. The country was much more broken, and in wet weather the road is difficult, especially on the approaches to the east fork of Cedar, which is covered by "bad lands." The approach to Bad Route Creek is bad, having to pass through three-fourths mile of alkali flat.

On the 29th, marched 11.75 miles to Cedar Creek, where Lieutenant Casey, of Colonel Miles's staff, met the command, with orders to remain in camp to await further instructions. The command remained here in camp until June 19, moving every few days for grass. Wood was plenty, and running water. The camp was made 15 miles above the mouth of Cedar Creek, a supply depot being established at its mouth, from which the command was rationed. All the small streams making into the Yellowstone in this vicinity are dry except during the wet season, for which there are two rea-

sons—evaporation and sinking of water. On the 1st of June a very severe storm arose, at first being only a cold rain, but finally turned into snow, which fell to a depth of 2 inches, but the next day was pleasant and the snow all melted off. On the 19th of June, in obedience to orders from Colonel Miles, the command started for Sunday Creek, marching to Cherry Creek, 6.1 miles. The road was very good, although from looking at it simply it would appear difficult. The country lying between the mouth of Clear Creek, the road, the Yellowstone, and the mouth of Sand Creek is covered with cone-shaped knolls, ranging from 50 to 500 feet in height, their sides being perfectly destitute of vegetation. This country is necessarily very difficult for a wagon-train, but the route selected by Lieutenant Long, Fifth Infantry, avoids a great many of these, and is the best road on the north side of the Yellowstone. The grass is fine, but timber scarce; also water is scarce, except during the wet season.

On the 20th, marched to Custer Creek (15.81 miles), the road being very good, but in a wet time the portion after entering the bottom on east fork of Custer Creek would be very difficult. Camp very poor, grass scarce, almost every inch of ground being covered with cactus; water and wood plenty. Mountain Sheep Butte was in sight all day. This is the most prominent landmark in this country, as it is at least 150 feet higher than any of its neighbors. The Indians use it as a point of observation, from which they can watch the country all around for several miles. Located on the divide between the Missouri and Yellowstone, it commands a good view on all sides. Custer Creek goes dry in summer, but water can generally be found in holes within half a mile of the crossing.

On the 21st, marched to Sand Creek (18.02 miles), passing through "bad lands," and over a road which would be almost impassable in wet weather, the country being one vast alkali bed. Camp was made on Sand Creek, where grass was very poor; wood and water plenty; water full of alkali.

On the 22d, marched to Sunday Creek, then crossed the plateaus beyond Sunday Creek and camped on the stream about 10 miles above its mouth. Road was very good, there being one steep pull going out of Sunday Creek bottom. Camp was fair; plenty of wood, water and grass, but there was too much sage-brush and cactus for comfort. Water is always found in Sunday Creek, although during the very dry season it does not run, but water can always be found in pools a short distance apart. The plateau between camp and Tongue River was covered with a most luxuriant growth of grass, which, if cut in time, would make good hay. The command remained in camp on Sunday Creek until July 4, moving two miles down stream on the 28th June.

On the 4th July, started on back trail, which route was followed to the point where it enters "bad lands," on East Fork of Custer Creek, where we changed direction, moving toward the headwaters of Cedar Creek. Camp was made on the 6th (53.40 miles from Sunday Creek) on Cedar Creek, about 8 miles above the June camp. Very cold water was found in springs and in more abundance than at the other camp; plenty of wood and fine grass.

On the 7th, marched 6.90 miles to main divide between Yellowstone and Missouri Rivers and camped on headwaters of Cedar Creek (East Fork). The headquarters and five companies remained in camp here until the 13th, the other five companies going on a scout under command of Lieutenant Colonel Otis, Seventh Cavalry. From Cedar Butte, on headwaters of East Fork Cedar, a very fine view is obtained of the course of Big Dry, on Missouri side, and Cedar and Cherry Creeks, on Yellowstone side of divide. Water is abundant, coming from springs; is very cold, and is almost entirely free from alkali. Grass abundant and of a very nutritious quality (buffalo). The timber consists of a scrub growth of ash, with occasional oaks along the creek banks, with cedars and small pines on hills and buttes. The road from the point where it left the main route was very good, the wagon-train always coming into camp shortly after the column. The crossings were good, the ravines having gravel bottoms, the banks sloping in places.

On the 13th, started back to Sunday Creek, with instructions to follow along the divide until opposite the mouth of Sunday Creek. The road was winding, and in places it was found necessary to descend from the divide. Just north of Mountain Sheep Butte the divide suddenly falls, the descent to the lower plateau being very sudden. The wagons were let down with ropes. Along this break for about a mile the divide is very narrow, the Yellowstone slope running up to the cut banks of tributaries to the Missouri. Camp was made on headwaters of a tributary to Big Dry, in the vicinity of Mountain Sheep Bottom. Day's march, 13.80 miles; water scarce; wood and grass plenty. A great amount of game was killed on this day's march, consisting of elk, black-tail deer, and antelope. Five bears were seen, but none killed. The country along this divide is filled with game during the summer and fall, but it is too cold here during the winter, in which season the game goes to river-bottom.

On the 14th, the march was continued 19.74 miles along the divide. The road was difficult on account of a very steep hill which it was necessary to cross. Immediately on each side of this ridge, which is very narrow here, the country is intersected by

very deep ravines and cuts, over which it is almost impossible to pass even with horses. Camp was made on the East Fork of Big Dry; water and grass plenty; wood scarce.

On the 15th, marched 19 miles to the East Fork of Sunday Creek, the road being much better than the two previous days. No wood; plenty of water; grass not very good.

On the 16th, marched 14.35 miles to Sunday Creek over a very good road. The country about Sunday Creek is very poor, consisting mostly of "bad lands." The soil is filled with alkali. The water is very bad, giving the troops dysentery and causing considerable sickness. The bottoms are very narrow and covered with sage-brush and cactus. Grass is poor, wood scarce. From this time until the 31st the command was camped on Sunday Creek, moving down stream every few days far enough to get fresh grass, wood, &c.

On the 31st, moved 16.75 miles down stream to its mouth, camping on Yellowstone, where a meadow of splendid grass was found and plenty of wood. The Yellowstone water was a grateful relief to the alkali compound which we had been drinking. Remained in this camp until the 10th of August, when the command was moved 4 miles down stream for fresh grass, &c. Scarcely had camp been established when orders came to move up to Tongue River, distant 16.55 miles. The command camped opposite Tongue River that night. The cause of the move was that a report of the Nez Percés Indians were coming through Montana and heading for the Judith Basin, when Colonel Miles ordered Colonel Sturgis with six companies of his regiment to start for the Judith Gap on the morning of the 12th. Preparations were made for taking ten days' rations from this point, with the intention of procuring thirty days' more at the mouth of the Bighorn. The route was along the Yellowstone to Pompey's Pillar, whence it diverged across to Muscleshell, and up that stream to the gap.

On the 12th, the command moved 18.50 miles, to a camp on banks of the Yellowstone, the road being very good with the exception of the descent to river-bottom, five miles above Tongue River, which is very steep; and although it is not very difficult to descend, is very bad for team going down stream. The bottoms are covered with a luxuriant growth of grass, which is very easily cut, the ground being level and easily passed over by mowers. Out from the bottoms, on the north side, the country is undulating, but on the south side very much cut up and intersected by deep ravines.

On the 13th, marched 26.46 miles up the Yellowstone, only leaving the river-bottom for 3 miles, the ascent to and descent from plateau being gradual. The road was very good throughout, but in wet weather there would be some difficulty at crossings. The Yellowstone from 50 miles above its mouth to the mouth of the Bighorn has very little variety; the same character of bottoms covered with same kind of timber; frequent sloughs from main stream form islands covered by a dense growth of cotton-wood.

On the 14th, marched 33.01 miles to the mouth of Froze to Death Creek. The road was very good, with the exception of descent to river-bottom 4 miles from camp, which was very steep. Grass was scarce at camp, but this was due to the fact that the Crows had been there only a short time before and their herds had eaten the grass off. A great many carcasses of ponies and dogs were seen here that had been killed or drowned by hail-storm which had fallen while the Crows were encamped there.

On the 13th, marched to the ferry, 5 miles above the mouth of the Bighorn. The descent to river-bottom, 4 miles from camp, was very difficult. The crossings, small streams, are difficult, in most cases requiring bridges, the material for which can be found at hand. The ferry is owned by a civilian, and consists of a flat with a rope stretched across the river worked with block and tackle. The depot for supplies destined to Fort G. A. Custer is on the south bank of Yellowstone, from which point to the post I was told there was a very good road. From the mouth of the Bighorn the country changes decidedly, becoming rough and broken. The hills are covered with a scrub growth of pine and cedars. The Yellowstone water is much clearer. The valleys are narrow but very fertile.

On the 16th, marched 8.12 miles up stream over a very rough and broken country. The right-line distance between the two camps is not more than 3 miles, but a detour from the river is necessary in order to find a road. Camp was made in the valley, with plenty of wood, water, and grass. The ravines are very deep, with cut banks, which render the road very difficult. From Cedar Butte a good view is obtained of the surrounding country, taking in the mouth of the Bighorn and its course to the Bighorn Mountains, distant about 90 miles.

On the 17th, the march was continued up the Yellowstone to Pompey's Pillar (24.24 miles) over a very broken country, which is exceedingly difficult in wet weather. The Yellowstone Valley averages about 2 miles in width, and a road has been made along there from the Upper Yellowstone, a ferry having been established at Bakein's Battle-ground. Pompey's Pillar was formed by a change in the channel of the river, cutting off a point of the hills, and is situated about midway of the channel. It rises about 80 feet from the water-level, is nearly circular, with a diameter of 75 yards at the base. The current of the river is very rapid and water very clear.

On the 18th, marched 21.45 miles to a camp on Long Creek, following a divide from the river, along which a very good road was found with no difficult obstructions. Water was found in pools and springs. These springs furnish water in small quantities the entire year. Grass is very fine (buffalo) wood scarce. This is an important camp in passing by this route from the Yellowstone to the Muscleshell, as it is the only place where water is found until after crossing the divide.

On the 19th, marched 39.14 miles to the Muscleshell River, crossing the divide at 9 a. m. The ascent is very steep, but a good road was cut out by Colonel Stanley in 1873, which is still in good condition. On the northern slope the descent is gradual, with one exception, to the Muscleshell. This one exception consists of a very steep hill, down which it was difficult to pass the wagons. From the highest point of the divide an extensive view is obtained of the Muscleshell Valley, and at this time the valley was covered with immense herds of buffalo. To the west the Crazy Woman Range is in plain sight, its summits covered with snow; on the north, the Little Snowy Range, similarly clad. The country along the Muscleshell is broken and hilly; the valleys narrow, but very fertile. The bottoms are covered with a growth of cottonwood and ash (cottonwood mostly), with an occasional scrub-oak. The hills have a growth (sparse) of scrub pine and cedar. The river is a swift-running stream, with an average depth of about 18 inches and 20 yards in width. The features of this country, with its magnificent grass pastures, make it the best game country of this entire region. The broken grounds furnish hiding places for deer, elk, bear, and all other game in great abundance, while the prairies are covered with buffalo during the milder months. Grass was scarce in camp, but this was due to the buffalo having been there in such immense herds that they had eaten it all off.

On the 20th the command remained in camp awaiting arrival of supply-train, which came in about 9 p. m.

On the morning of the 21st, dispatches were received which informed the commanding officer that the Nez Percés had changed direction and were moving in the direction of the Wind River country. General Sturgis determined to turn toward the Yellowstone, intending to intercept them if they came down the Yellowstone or out of the Park by way of Clark's Fork. The route lay along a divide running south, the road being very good, including crossings to small streams. Camp was made 17.85 miles from Muscleshell, on the headwaters of a small tributary; water, grass, and wood plenty. The ascent to the divide was difficult, but the best here of any point that I have seen.

On the 22d marched 22.90 miles to Big Willow Creek, passing through an alkali flat for about 5 miles at the headwaters of Cañon Creek. This flat would be impassable in wet weather, but a good wagon-road can always be found skimming the foot-hills to the west of the road. Big Willow Creek is a small stream fed by springs which furnish water the year around; grass and wood plenty for camping purposes.

On the 23d marched to Yellowstone, 2 miles above mouth of Stillwater, camping near Huntington's ranch. This route from the Muscleshell is the most practicable of any in this region, there being only two difficult places, the ascent to the divide from the Muscleshell, and the descent to the Yellowstone bottom from same direction. A road has been cut around the point opposite the mouth of Stillwater, over which toll is exacted.

On the 24th remained in camp, and on 25th marched to Crow Agency, fording the Yellowstone opposite Huntington's ranch. The ford is very difficult on account of the velocity of the current, the stream at this point being a perfect torrent, and also the great number of rounded stones on the river-bed. It is fordable only in low-water (latter part of August, September, and October). The stream separates into two channels about 100 yards wide each. The Stillwater is a mountain torrent, the water moving at a velocity of about 10 miles an hour with an average depth of 1 foot and 20 yards in width. The valley is very fertile and surrounding country beautiful. The hills which inclose on each side are covered with pine and cedar to a point about 2 miles below the agency, from whence there is a depression to the mountain base, which has no timber except along streams. The Snow Mountains are about 20 miles south of Crow Agency, and were then covered with snow, but this was unusual, as the snow generally melts off in July and does not cover them again until September. The command remained at Crow Agency until the 31st. The weather was delightful, cool breezes coming down from the mountain continually, invigorating men and animals.

On the 31st the command marched to Bandans Fork (local name "Red Lodge Creek"), 11.47 miles, which is a small, sluggish stream tributary to Rocky Fork, and is peculiar for its current only, which differs from the other mountain streams by reason of its slow current. Trout, that are found in great numbers in the bolder mountain creeks, shun this almost entirely. The road was very good with the exception of the hill at the agency, which is very steep, requiring three teams to pull up one wagon. It leads over a broken country which is covered with a luxuriant growth of grass, but destitute of timber except along creek bottoms. Camp on Bandans Fork; plenty of wood, water, and grass.

September 1, marched 23.37 miles to Clark's Fork, the road leading down Bandans Fork to its junction with Rocky Fork, and down this stream to another 6 miles of its junction with Clark's Fork. This is the only practicable route across to Clark's Fork, as the mountain foot-hills make it impracticable for a wagon-train to leave the valley of the streams. Rocky Fork is a bold mountain-stream, averaging about 2 feet in depth and 20 yards in width. The water is very clear and cold. The stream is filled with trout, of which a great many were caught. Ash, cottonwood, boxelder, and occasional oaks are found along the banks of the stream, the valleys covered with grass.

From the Crow Agency to the junction of Rocky and Clark's Forks the command followed the F. and C. F. Smith and Bozeman road, but here changed direction, going up Clark's Fork 8 miles to camp, which was made in bottom where good grass and plenty of wood were found. Clark's Fork is a swift-running mountain-stream, averaging 2 feet in depth and 50 yards in width. On the banks grow ash, cottonwood, and willows. The country from the Crow Agency to this point is excellent for stock-raising, as its broken character adapts it peculiarly to this branch of industry. In the valleys during the winter ample protection could be found for stock, and food would be found in same places. During the summer the valleys and hills are covered with a splendid growth of grass.

On the 2d of September the command remained in camp awaiting arrival of supply-train from Crow Agency.

On the 3d moved up Clark's Fork 21.56 miles. From the last camp the grass seems to stop growing, the bottoms being covered with a growth of sage-brush, sometimes 8 and 10 feet high. The ground is covered with round stones, the washings from the mountains; stones, cactus, and sage-brush all seem to be contending for ownership of the land, and are all well represented. Camp was made on Clark's Fork, with no grass; plenty of wood and water. From this camp to the base of the mountains the country was the same as that passed over the preceding day, being all of a particularly uninteresting nature.

On the 4th, marched 17.56 miles to base of Snowy Mountains. Camp was made on a little mountain-stream, with plenty of wood and water, but no grass.

On the 5th camp was moved 2 miles up this stream to a recess in the mountains where a meadow of about a hundred acres was found which was covered with very good grass. The command remained here until the 7th, when it moved across to main cañon of Clark's Fork, a similar recess being found where sufficient grass for the command was found. Heart Mountain, the most prominent landmark, lies 16 miles south of this cañon (bearing 349½-329½). It can be seen for 40 miles down Clark's Fork, and is situated on the divide between Clark's Fork and Standingwater.

On the 8th two scouting parties that had been sent out in the morning returned, one reporting that two scouts sent out the day before had been found shot (one dead, the other wounded), and the other scouting party reported that the Indian village was across the mountain. The road from the cañon to Stinkingwater was found to be impracticable for wagons, and the order was given for the pack-train to be prepared and the wagon-train to return to the Crow Agency. The command moved at 6 p. m., making a night's march of 15 miles over a very broken country to a camp at foot of Heart Mountain on a tributary of Clark's Fork. This country along the base of the mountains is exceedingly rough and broken, cut up by deep ravines, and altogether impracticable for wagons.

On the 9th marched 35 miles to a tributary of Stinkingwater, passing around point of mountains and crossing Stinkingwater below the cañon. The road was over an exceedingly rough, barren, and broken country with scarcely any vegetation. The Stinkingwater, so named from the sulphur odor of its water, is a bold mountain-stream of about 3 feet average depth and 50 yards wide. It has steep-cut banks below the cañon, and the crossing for horses and pack-animals was very difficult. The sulphur fumes are distinctly noticeable a mile from the stream, all coming from the sulphur-beds in the cañon. The cañon was formed by the river cutting off a spur of the mountain, and is about 4 miles through. No traces of sulphur were found above the cañon. Tolerable grass was found at camp, with plenty of wood and water. The surface of the ground is covered with lavas, both feldspathic and basaltic. I had not the time here to estimate or collect specimens, as the command was moving rapidly and I was engaged with the scouts. In the upheaval which formed the mountains two distinct ridges were formed, the outer one being nothing like so great an altitude as the inner one. The two are separated by a valley varying from 2 miles to a few hundred yards in width. The strata in places are nearly vertical, and at the mouth of Clark's Fork Cañon one ledge was completely overturned. No timber grows in the valley of the Stinkingwater below the cañon, and indeed there is scarcely a sign of vegetation of any kind on this stream where the trail first meets it. The mountains are covered with a growth of pine-trees having a diameter in some cases of 4 feet.

On the 10th marched 22 miles over a very difficult road. Leaving the small stream on which camp was made, the command passed around the cañon of the Stinking-

water, crossing that stream about 5 miles above the head of the cañon. Passing the main stream and going to the middle fork, the ascent of the mountain was made by following along the valley of this branch. The valley was very narrow and the road exceedingly difficult, often compelling a movement by file. Camp was made in a depression near the top of the range, where an abundance of wood, water, and grass was found. Snow was lying in patches within 300 yards of camp. The march was a very tedious one, on account of the roughness of the country and the continually increasing rarity of the atmosphere. The altitude at camp was about 7,500 feet.

On the 11th crossed the mountains, coming down within a mile and a half of the mouth of Clark's Fork Cañon. The crest was followed about 8 miles to where the Indian trail was discovered leading out from the cañon on the east side of the range. The descent was exceedingly difficult, several of the pack-mules rolling down the side of the mountain for some distance before they could recover themselves. From the interior basin, and on what is known as the "Smelter Trail," there are two ways out of the mountains; one by the Stinkingwater, and the other across the mountain coming down by Clark's Fork. What is generally called by guides and others in that country as Stinkingwater Cañon is incorrect, as from the valley within a trail through a cañon cut by a tributary to Clark's Fork is followed to the mountain crest, and from this point to the Stinkingwater Basin the valley after the middle of Stinkingwater Fork is followed, the cañon of Stinkingwater being impracticable altogether. The ignorance of the guides and their confusion in this respect misled the commanding officer as to the position of the two streams, when, had he been correctly informed, it would have been very easy to move to a position on the crest which would have commanded both outlets. On coming down the mountain-side it was found that the Indians had gone down Clark's Fork the same day that we had started for Stinkingwater.

On the 12th marched 48 miles down Clark's Fork to its junction with Rocky Fork. A description of this day's route has already been given.

On the 13th, continued down Clark's Fork for 8 miles, then passed to the plateau, about 5 miles wide, between the Yellowstone and Clark's Fork. A ford across the Yellowstone was found, which was crossed without much difficulty, although a wagon-train would have to cut the banks on right side before coming to river-bottom. While the head of column was waiting for the pack-train and rear guard to cross the river a scout brought in word that the Indian camp was about 6 miles downstream. "To horse" was sounded immediately, and the march was downstream for about 2 miles, when word was sent back that the Indians were moving toward the mouth of the cañon on Cañon Creek; changed direction so as to try and intercept them, and when about 10 miles from ford overtook them, but not soon enough to prevent them from taking possession of the mouth of the cañon. The cañon is a deep cut with precipitous sides of about 160 feet in height. The valley is very narrow, being about 50 yards wide at the upper end. The Indians took possession of this and held it until night-fall, previously disputing every inch of ground, and they could only be dislodged by flanking them. Camp was made on the battle-field; grass poor, wood scarce, water alkaline.

On the 14th, started in pursuit of Indians, following up Cañon Creek through the main cañon, which was 6 miles long. After coming out of the cañon, passed to high grounds between Yellowstone and Muscleshell, passing to the east of alkali lakes where Cañon Creek had its source. The route led directly across Muscleshell, coming to that stream 7 miles above the camp of August 19-20; the road very good and practicable for wagons, with the exception of that portion that passes through the cañon. On arrival at Muscleshell, the exhausted condition of the animals, together with the fact that the command had been without rations for two days, determined the commanding officer to await the wagon-train from the Crow Agency. Remained in camp on Muscleshell and on a small tributary 4 miles out until 22d, when the wagon-train having arrived, and being joined by General Howard's command, the march was again resumed, going across Muscleshell to Careless Creek in the direction of Judith Gap. The road from the Muscleshell to Careless Creek was over a very broken country, cut up by ravines with steep banks, which had to be cut down before the train could cross. The grazing would have been very good, but the vast herds of buffalo that had been here in August had eaten off the grass almost entirely. Timber in small quantities grows along coulees and small streams, mostly cottonwood, with occasional ash and oak.

Remained in camp 23d, and on 24th marched 8.35 miles to Fish Creek, where camp was made, with plenty of wood, water, and grass.

On 25th, moved along base of Little Snowy Mountain, over a broken country, but found a very good road for wagons. Crossed the divide at 10 a. m., and entered the Judith Basin. Went 2 miles to the right of trail in order to get wood. Camp was made at the base of the mountain, on a little mountain rivulet, where plenty of grass and wood were found.

On 26th, marched 20.74 miles to Beaver Creek, skirting the base of the Little Snowy Mountain, came into Carroll road at 9.05 a. m. 8 miles from camp, and from this point

to Carroll this road was followed. Beaver Creek has a current of about a mile to the hour, is about 1 foot average depth and 10 yards wide. Camp was made without wood; plenty of water and fine grass.

On 27th, marched 15.75 miles to a camp at base of mountains, crossing Big Spring Creek, which is the main tributary of Judith River from the east side. A divide of 3 miles to the right was made in order to get wood. The camp was made at a small spring coming out of the mountains, which sinks 200 yards from its source; wood and grass in abundance.

On the 28th, marched 22.89 miles to a camp on Box Elder over a very good road. It was necessary to haul wood from Arnell's Creek, 8 miles from camp; water and grass plenty.

On 29th, marched 20.87 miles to a camp on Crooked Creek. It rained the night before and during the day, and the route leading over a very broken country made the day's march exceedingly difficult. Water was found in holes, and wood was obtained in small quantities along the stream, but practically this country along the road is destitute of timber.

Remained in camp the 30th.

October 1, marched 20.96 miles to Carroll, on the Missouri River, the road leading along a divide which extends to the river bottom, and which was passed over without any difficulty, notwithstanding recent rains. The bluffs on each side of the Missouri River rise abruptly from the bottom, and are cut up by deep ravines, with cut banks, rendering them impassable in most places. A sparse growth of pine and cedar is found along the bluffs. The bottoms are covered with a growth of cottonwood, leaving occasional open places that are covered with a rank growth of sage-brush. The abruptness of both the ascent and descent to the river bottom along this portion of the Missouri renders it exceedingly difficult to take a wagon-train through this country. The portion of country from the Muscleshell to Carroll, through the Judith Basin, is the finest for stock-raising that I have seen in the Northwest. Grass is abundant, and numerous springs and little streams near the mountains furnish plenty of water. The valleys near the base of the mountains and other protected spots would furnish protection during the winter, so that stock could be kept the year around without feeding. The difficulty in traveling along this route is the scarcity of wood, which, although there is plenty of timber on the mountains, yet they are generally too far off to furnish wood for camps.

Remained in camp on the 2d, on the afternoon of which day news was received from General Miles that he had surrounded the Nez Percés camp. Preparations were immediately made for ferrying the river, which was done on the steamer Silver City on the 3d.

On the 4th, marched 25 miles to the headwaters of Little Rocky Mountain Creek, and camped near the base of the Little Rocky Mountains. The ascent from the river bottom was very steep, requiring three teams to each wagon. After the plateau was reached the road led over a rolling prairie to the base of the mountains. Grass was scarce; plenty of wood and water. Moved camp 3 miles on the 5th, and there waited the arrival of the infantry, which had been sent by boat to the mouth of Little Rocky Mountain Creek, and afterward came up by land to our camp.

On the 6th, marched 18.71 miles to a fresh-water lake on the west side of Little Rockies, passing over an old cart-trail which was made by Indians (half-breeds) from old Fort Browning and vicinity, going to Carroll to trade. The trail leads between Black Butte, at southwest point of Little Rockies, and the main range is difficult, leading across several deep-cut ravines. After coming out of the pass the route led across a rolling prairie for about 5 miles, when it descended to the valley of Peoples Creek, the descent being very steep. After going 4 miles down the valley of this stream the route led again to the plateau, the ascent being gradual. Camp was made 2 miles from Peoples Creek; no wood, with plenty of grass and water.

On the 7th, received news that the Nez Percés had surrendered to General Miles, when the command turned back and camped on Peoples Creek. The next day Colonel Sturgis and staff received orders to proceed to Fort Lincoln by steamer, and with this intention the headquarters on the 8th proceeded to the Missouri, at the mouth of Little Rocky Mountain Creek, for the purpose of there taking the steamer. The command afterward marched to a camp on the Missouri, opposite the mouth of Squaw Creek, where they remained until the 28th, when orders were given by the department commander to proceed to Fort Buford. The command marched to Fort Buford, where it remained until December 19, when it started for Fort Abraham Lincoln, arriving at that place December 30.

The total distance traveled by the command was 1,953.66 miles from the time it left Fort Abraham Lincoln to its return to that post. In addition to this, each company did its regular tour of scouting duty and detached service while in camp on the Yellowstone, so that the total amount of the summer's and fall's march would sum up about 2,300 miles.

BOTANICAL OUTLINES OF THE COUNTRY MARCHED OVER BY THE SEVENTH UNITED STATES CAVALRY, DURING THE SUMMER OF 1877; BY V. HAVARD, ASSISTANT SURGEON, UNITED STATES ARMY.

The Seventh Cavalry, under command of General Sturgis, during its late campaign, extended its operations from Fort Abraham Lincoln, Dak., westward, to the eastern boundary of the National Park, and northward, through the Judith Basin, to Milk River. Being on duty with the regiment, I thus had opportunities for observing the botanical character of the northwestern quarter of Dakota and the whole of that portion of Montana lying east of the mountains, comprising about 1,000 miles of the Upper Missouri with its main tributaries, Milk River, the Muscleshell, and the Yellowstone from the cañon to its mouth.

The region as above defined is based almost immediately on Cretaceous or Lignite Tertiary beds. It consists mostly of rolling prairies and tablelands, intersected by minor mountain ranges, and drained by numerous deep-cut ravines, emptying at long intervals into shallow, often alkali, creeks.

The extensive denudation which has taken place by rain and swollen streams on the soft sandstones and clays of the outlying strata is everywhere manifest in the ravines and gullies or "coulées" which scar the bottom-lands, in long rows of castellated bluffs and dreary expanses of "bad-lands." Its general normal altitude is about 2,500 feet, being somewhat less below Buford, but considerably more on nearing the mountains. Its flora is not rich, but yet not as scant as one would naturally think, viewing the endless succession of sandy ridges or grassy swells, with their despairing sameness of shape, exposure, and soil. However repulsive in aspect, they always bear some vegetation, often thick and luxuriant, but at times scattered and scrubby. This vegetation consists entirely of herbs and shrubs. Well do these plains deserve the epithet of treeless. Trees are only seen on river-bottoms and ravines, where they obtain the requisite moisture and are protected against fire and wind.

I am not now prepared to give a full list of all the plants found and identified; this would require more time and labor than I can afford. My design in this paper is to illustrate the main and salient features of the general flora, enumerate the trees and shrubs, of which I believe I can give a tolerably full catalogue, and close with a notice of the useful and ornamental plants.

About 300 species were examined and many of them collected, belonging to about 200 genera. I think that outside of the mountains the whole number of phanogamous species does not exceed 400.

For the sake of convenience, the flora of this region may be studied as it occurs on the prairies, on the bottom-lands and ravines, on the bluffs and bad lands, and on the mountains.

The prairies are generally covered with grass, thin-bladed but close-set, tufted, and of good nutritive qualities. It consists mostly of Buffalo Grass (*Bouteloua oligostachya* and scattered specimens of *B. curtipendula*); Porcupine or Spear Grass (*Stipa comata*, the prevalent species, *S. spartea*, *S. viridula*); Quick Grass (*Triticum repens*); Barley (*Hordeum jubatum* and *pratense*); Beard Grass (*Andropogon furcatus* and *scoparius*); Cat's-tail Grass (*Phleum pratense*); several species of Meadow Grass (*Poa*), together with many Leguminous and Composite genera (*Astragalus*, *Artemisia*, *Erigeron*, *Liatris*, &c.). The Prairie Plantain (*Plantago patagonica* var. *guaphalioides*) is also very common.

On the bottom-lands and ravines are the trees and shrubs described below, of which the following are most prevalent: Poplars (*Populus*), Willows (*Salix*), Ash-leaved Maple (*Negundo*), Sage Brush (*Artemisia*), Rose Bush (*Rosa*), Choke Cherry (*Prunus*), Buffalo Berry (*Shepherdia*), Grease Bush (*Sarcobatus*), Snow Berry (*Symphoricarpos*). Rank grasses: (*Calamagrostis*, *Spartina*, *Elymus*, *Muhlenbergia*, *Phragmites*, &c.). Showy annuals, of which may be mentioned, on account of their abundance: Sunflower (*Helianthus lenticularis*), Wild Liquorice (*Glycyrrhiza lepidota*), and *Grindelia squarrosa*.

The ubiquitous Cactus (*Opuntia missouriensis*), the plague of the Western plains, thrives equally well on prairies, bottom-lands, and bad-lands.

The bluffs and bad-lands present a great variety of species: Red Cedar (*Juniperus*), in its arborescent and prostrate forms, the Aromatic Sumach (*Rhus*), Pine (*Pinus*), above Fort Peck on the Missouri and Porcupine Creek on the Yellowstone. Many showy plants: *Yucca*, *Astragalus*, *Lupinus*, *Oxytropis*, *Potentilla*, *Euthera*, *Fritillaria*, *Calochortus*, *Mentzelia*, &c. Those indicative of alkali soil: *Sarcobatus vermiculatus*, *Obione confertifolia* and *canescens*, *Eurotia lanata*, *Snada torreyana*, *Corispermum hyssopifolium*, &c. The last-named plant formed the only visible vegetation on most of the bad-lands intervening between the mouth of the Muscleshell and Fort Peck, on the north side of the Missouri.

The flora of the mountains, very different from that of the plains, is characterized by forests of Pine (*Pinus*) and Fir (*Abies*), groves of Red Cedar (*Juniperus*), and on the banks of the streams, issuing from their flanks, clumps of Quaking Asp (*Populus*), Alder (*Alnus*), and Birch (*Betula*). Two species of *Gentiana* (*saponaria* and *barbellata* Eng.), two of *Castilleja* (*affinis* and *linariaefolia*), two of Gooseberry (*Ribes irriguum* and *cereum*),

one of Cinque-Foil (*Potentilla fruticosa*), one of Avena (*Geum triflorum*), two of *Anemone* (*Virginiana* and *multifida*), one of Stone-Crop (*Sedum stenopetalum*), the American Columbo (*Fraxera speciosa*), &c., were observed, together with several *Astragali* and many *Compositæ*.

TREES AND SHRUBS.

SALICACEÆ.

(Willow Family.)

Populus monilifera (Cottonwood).—Forms the bulk of the timber on all valley-bottoms from Fort Lincoln to near the eastern range of the Rocky Mountains. The only Poplar at Pompey's Pillar; it becomes scarce at the mouth of the Big Rosebud, and probably disappears completely a short distance farther up, before reaching the cañon of the Yellowstone. Up Clark's Fork it disappears about 20 miles from its mouth. On the Muscleshell, where it is crossed by Colonel Stanley's trail, the Cottonwood and Willow-leaved Poplar (*Populus angustifolia*) are about equally mixed. Not seen north of the Muscleshell until reaching the Missouri Basin. At Carroll, on the Missouri, the Cottonwood still holds undisputed possession of the bottom-lands; not found on Big Rosebud and other tributaries of the Yellowstone above it, being there replaced by the two varieties of the Balsam Poplar (*Populus balsamifera*) and the Aspen (*Populus tremuloides*).

At the latitude of the Northern Pacific Railroad I have not met with the Cottonwood east of the Missouri basin; the only Poplar found on the Red River being the Aspen (*Populus tremuloides*).

Whole groves of Cottonwood were seen with their trunks stripped by the Indians, who use the inner layers of the bark as a mucilaginous and anti-scorbutic food.

Populus angulata (Angled Cottonwood).—Distinguished from the last by its angular and winged branches, not as common on the Missouri as on its affluents. Habitat, same as preceding, of which it seems to be merely a variety.

Populus balsamifera (Balsam Poplar; Tacamahac).—Abundant under two distinct forms:

Var. candicans (Balm of Gilead).—Scarce on Muscleshell; common on Yellowstone above the Big Rosebud, on Big Rosebud, Rocky Fork, forks of Milk River (Dawson); nowhere as abundant as the nest or narrow-leaved variety.

Var. angustifolia (Willow-leaved Poplar).—Becomes the prevailing tree and forms the bulk of the timber on river-bottoms from the line of longitude and altitude marking the limits of the Cottonwood. Quite abundant on Yellowstone at and above Big Rosebud, on Rosebud, Rocky Fork, Clark's Fork, on the Muscleshell above the Bend, in Judith Basin, and on the streams issuing from the Little Rocky Mountains. Beautiful, lofty tree, generally from 1 to 4, but sometimes 6, feet in diameter, with white glistening bark and dense, graceful foliage. When small has somewhat the habit of *Salix cordata*. Has a straighter trunk and finer-grained wood than the *monilifera*. Inner bark sometimes used as killikinnick.

Populus tremuloides (American Aspen).—Only near the mountains at high elevations. Big Rosebud, Clark's Fork, Judith Basin, Little Rocky Mountains. Small, seldom more than 3 to 4 inches in diameter.

Salix cordata (Heart-leaved Willow).—Common on Missouri, Muscleshell, Rosebud, &c. Shrub or seldom a small crooked tree.

Salix longifolia (Long-leaved Willow).—An elegant species with straight stems and slender foliage. Common on Yellowstone, Muscleshell, and Missouri. Shrub or small tree.

Salix discolor (Glaucous Willow).—Somewhat larger than the two preceding, and affording tolerable fuel. Large shrub, or small scrubby tree. Missouri, Yellowstone, Clark's Fork, Big Rosebud, Little Rocky Mountains.

Salix nigra (Black Willow).—Shrub or small tree. Yellowstone (Cedar Creek), Big Rosebud, &c.

CONIFERÆ.

(Pine Family.)

Juniperus Virginiana (Juniper, Red Cedar).—Shrub or tree, often from 20 to 40 feet high. Rare east of Tongue River, common beyond it on bluffs and mountains. Found at a lower altitude than the pine, hence extends into the pine region, but becomes rare at very high elevations.

Juniperus sabina, var. *procumbens* (Running Cedar; Ground Cedar).—This pretty species, common on rocky bluffs, spreading over them its carpet of slender twigs and matted foliage, belongs to a lower elevation than the preceding. From Fort Lincoln to Carroll, north and south of the Missouri. At Carroll shows itself under two forms: one distinctly glaucous-white, the other dark green, both more or less erect.

Juniperus communis, var. *alpina*.—Rare; Shoshonee Mountains and hills of Judith Basin.

Pinus ponderosa (Yellow Pine; Bluff Pine).—The characteristic pine of this region. First seen in our march up the Yellowstone on the bluffs of Porcupine Creek, at an altitude estimated at 3,000 feet. Hence common westward. On the Missouri it is first met between Fort Peck and the Muscleshell. There is none at Fort Peck, but at the mouth of the Muscleshell pine groves cover the bluffs, and the upper half of the slope. At Carroll they reach the valley bottom. By reference to the map it will thus be seen that the eastern line of the pine region in Montana is about the 107° of longitude. This pine extends to the base of the Rocky Mountains and some distance up their side, but is replaced on the summit of the Shoshonee and Snow Mountains by the *Pinus flexilis*. It constitutes the timber of the hills of Judith Basin and of the Little Rocky Mountains. The *Pinus ponderosa* of this region is usually a tree 15 to 30, seldom 50, feet high, with short crooked trunk and close-grained, heavy wood. Leaves rarely more than 3 inches long, and cones correspondingly small.

Pinus flexilis, James (Flexible Pine).—Tree of good size, 1 to 2 feet in diameter, with very elastic and resinous limbs, smooth ash-colored bark, found only in the Shoshonee and Snow Mountains, where, together with the *Abies Douglasii*, it forms dense groves.

Abies Douglasii, Lind. (Douglas' Fir).—Tall, handsome tree, with horizontal drooping branches; found in company with the preceding and on the bluffs of Missouri. Wood coarse-grained, but tough and hard.

BETULACEÆ.

(Birch Family.)

Alnus incana, var. *glauca* (Western Alder).—Only found on Big Rosebud. Shrub, 5 to 15 feet high, with stems 2 to 5 inches in diameter.

Betula occidentalis, Hook. (Western Birch).—Shrub, 5 to 20 feet high, 1 to 4 inches in diameter, with straight elastic shoots, making good fishing-rods. Headwaters of Clark's Fork, Big Rosebud, Judith Basin.

SAXIFRAGACEÆ.

(Saxifrage Family.)

Ribes aureum (Buffalo or Missouri Currant).—Conspicuous by its early yellow blossoms and yellow palatable berries ripe in August. Common on Missouri, Yellowstone, Cedar Creek, Muscleshell.

Ribes cynosbati.—Red, prickly berries, scarcely edible, ripening in August. Cedar Creek and Muscleshell.

Ribes floridum (Wild Black Currant).—Cedar Creek, Crow Agency. Edible berries, ripening in September on Big Rosebud.

Ribes cereum (Resinous Currant).—Small, hairy, unpalatable berry. Snow and Little Rocky Mountains.

Ribes irriguum, Dougl. (Mountain Stream Gooseberry).—Prickly shrub, bearing abundant large, black berries, very pleasantly flavored. Cañons of Shoshonee and Snow Mountains.

Ribes lacustre (Marsh Gooseberry).—Small, unpleasant fruit, ripening in August. Cedar Creek.

ROSACEÆ.

(Rose Family.)

Rosa blanda (Early White Rose).—Variable in size and appearance. Stem often large enough to make walking-sticks. Abundant in Missouri, Yellowstone, and most valleys. The only rose found.

Crataegus tomentosa, var. *mollis* (Black or Pear Thorn).—A tall shrub, blossoming in May. Missouri Valley. Not common.

Crataegus Douglasii, Lehm. (Brook Thorn).—Tall, thorny shrub, with large, blackish, edible, punctated berries, ripe in September. Cedar Creek, Judith Basin.

Amelanchier Canadensis (June Berry; Pennsylvanian Berry).—Shrub, with purplish, sweet, edible berries, ripe in July. Often one of the ingredients of pennsylvanian. Cedar Creek. Not common.

Prunus Virginiana (Choke Cherry).—A very common shrub in all the valleys of this region. Blossoms in May. Berries ripe in August, but improving in taste until October. Eaten in considerable quantities by the command, without any unpleasant effects.

Potentilla fruticosa (Shrubby Cinque-Foil).—Low, ornamental shrub. Snow Mountains and Judith Basin. Common.

COMPOSITÆ.

(Composite Family.)

Artemisia cana, White (Sage-brush). Shrub, 1 to 3 feet high; abundant on most bottoms; the most prevalent sage-brush of this region, and, I am informed, of the Black Hills. It makes tolerable fuel when dry, and in many places is the only kind obtainable.

Artemisia tridentata (Three-toothed, Common Sage-brush).—First seen on Sunday Creek, hence common westward. Rather small sized.

Artemisia trifida.—Found in company with the *tridentata*; much rarer.

Artemisia Ludoviciana (Western Mugwort).—Not common.

Var. *latiloba* (Woolly Herb).—Judith Basin.

The other species of *Artemisia* found, but all herbaceous, are the *biennis*, *dracunculoides*, and *frigida*. Common, specially the *frigida*.

ELÆAGNACEÆ.

(Oleaster Family.)

Shepherdia argentea (Buffalo or Bull Berry).—Common on the Missouri, from Lincoln upward; Yellowstone, Muscleshell. Blossoms in May, fruit ripening in August, but best flavored after being touched by frost in November. On December 1 still quite palatable. Supplied a needed article of food to the command. No unpleasant effects noticed from its use.

Shepherdia Canadensis (Canadian Bull Berry).—Shrub with yellowish, insipid fruit. Judith Basin.

Elaeagnus argentea (Silver Berry).—Small shrub with silvery leaves. Cedar Creek and Judith Basin.

URTICACEÆ.

(Nettle Family.)

Ulmus Americana (American or White Elm).—Only seen on the higher grounds of the Missouri Valley, between Lincoln and Buford. Not found west of Buford. A small tree.

Humulus lupulus (Common Hop).—Common on Missouri and Yellowstone.

CUPULIFERÆ.

(Oak Family.)

Quercus macrocarpa (Burr-Oak; Mossy-Cup Oak).—Middle-sized tree, 20 to 50 feet high, 1 to 3 feet in diameter. Missouri bottom along the base of the bluffs and in ravines. Common between Stevenson and Lincoln and downward, but rare above Stevenson and not found at Buford and westward.

CAPRIFOLIACEÆ.

(Honeysuckle Family.)

Symphoricarpus occidentalis (Snowberry; Wolf berry).—Abounds throughout this region.

Symphoricarpus vulgaris (Coral Berry).—Cedar Creek. Not common.

OLEACEÆ.

(Olive Family.)

Fraxinus Americana (White Ash).—On the higher grounds of the Missouri bottom, and in ravines. From Lincoln to Carroll, in small groves. Nowhere abundant. Most common on the affluents of Missouri between Peck and Buford. On Yellowstone, first seen 15 miles above Tongue River. Cedar and Sunday Creeks. Not met with on the Muscleshell. Middle-sized tree, sometimes 2 feet in diameter, but with short, crooked trunk, not very suitable for timber.

ACERINEÆ.

(Maple Family.)

Negundo aceroides (Ash-leaved Maple; Box-Elder).—A very hardy, thrifty shrub or small tree. Common on the banks of the tributaries of the Upper Yellowstone and those of the Missouri above Buford. Often running up in ravines to the summit of the slopes. Cedar Creek, Rocky Fork, Little Rocky Mountains, &c. Next to poplar and willow, the most prevalent tree observed.

CHENOPODIACEÆ.

(Goosefoot Family.)

Sarcobatus vermiculatus, Torr. (Grease-Bush).—First seen, on the Yellowstone, at Custer Creek; hence very common westward, on alkali, sandy bottoms and buttes. Rare below Buford.

Obione confertifolia, Torr.—Abundant on Cedar and Sunday Creeks and most tributaries of Yellowstone. On sandy, alkali bottoms and bad-lands. Often found in company with the preceding.

Obione canescens, Moq.—Sunday Creek and other tributaries of the Yellowstone. Common on bad-lands.

Eurotia lanata, Moq. (White Sage).—Common all over this region, especially westward, on dry, sandy soil. "Retains its foliage and fruit through winter, and valuable for its fattening qualities for stock" (Serenio Watson).

Suaeda Torreyana (Western Blite).—Small, 12 to 18 inches high, but caudex distinctly woody and perennial. Common on alkali flats and bad-lands.

ANACARDIACEÆ.

(Sumach Family.)

Rhus toxicodendron (Poison Ivy), var. *radicans*.—Common. Sunday Creek, Muscleshell.

Rhus aromatica, var. *trilobata* (Fragrant Sumach).—Small shrub with pretty foliage; found everywhere on stony, gravelly bluffs from Lincoln to Little Rocky Mountains.

ERICACEÆ.

(Heath Family.)

Arctostaphylos Uva-Ursi (Bearberry).—Judith Basin; bluffs of Upper Missouri, Little Rocky Mountains, Snow Mountains. The dried leaves used as "kinnikinnick," either alone or mixed with tobacco, by Western Indians and frontiersmen.

CORNACEÆ.

(Dogwood Family.)

Cornus stolonifera (Red-Osier Dogwood).—Very common on Missouri and Yellowstone. Inner bark furnishes the "kinnikinnick" of the Sioux Indians. According to Dr. Matthews, U. S. A., the *Cornus sericea* is used for the same purpose, but was not found.

VITACEÆ.

(Vine Family.)

Vitis cordifolia (Winter or Frost Grape).—Missouri and Yellowstone.

CELASTRACEÆ.

(Staff-Tree Family.)

Celastrus scandens (Climbing Bitter-Sweet).—Shrub, with conspicuous scarlet pods. Seen once between Buford and Stevenson, and at Fort Lincoln.

LILIACEÆ.

(Lily Family.)

Yucca angustifolia, Pursh (Adam's Needle).—Common on the bluffs of the Yellowstone. Opens its white, showy flowers in June. Pod ripe in August.

CACTACEÆ.

(Cactus Family.)

Opuntia Missouriensis (Missouri Cactus).—Common on Missouri ravines above Buford, rare below; abundant on the plains of the Yellowstone; often so closely set that horses cannot find sufficient clear room for rolling. Disappears at high elevations. Blossoms in June, each showy, yellow flower remaining open 5 or 6 days.

Mamillaria vivipara (Tuberculated Cactus; Turk's Head).—Yellowstone plains; less common than preceding. Blossoms in June; flowers pinkish.

RANUNCULACEÆ.

(Crowfoot Family.)

Clematis ligusticifolia (Western Virgin-Bower).—Common. Cedar Creek, mouth of Bighorn, Big Rosebud, &c. Var. *brevifolia*, Pompey's Pillar.

ANIFOLIACEÆ.

(Holly Family.)

Ilex opaca (American Holly).—Probably this species. The foliage of 1 specimen only observed in Judith Basin. Dwarfish.

Looking at the flora of this region in its utilitarian aspect, I find that the species suitable for timber are, outside of the mountains: *Pinus ponderosa* (Bluff Pine); *Juniperus Virginiana* (Red Cedar); *Quercus macrocarpa* (Oak); *Fraxinus Americana* (Ash); *Ulmus Americana* (Elm); *Populus monilifera* (Cottonwood); *Populus angulata* (Cottonwood); *Populus angustifolia* (Poplar); *Populus canadensis* (Poplar). On the mountains: *Pinus flexilis* (Flexible Pine); *Abies Douglasii* (Douglas, Fir). In all, 11 species.

The food-yielding species are as follows. Those with edible fruit: *Shepherdia argentea* (Bull Berry); *Prunus Virginiana* (Choke Cherry); *Vitis cordifolia* (Frost Grape); *Amenlanchier Canadensis* (June Berry); *Crataegus Douglasii* (Brook Thorn); *Ribes rivularis* (Mountain Stream Gooseberry); *Ribes aureum* (Missouri Currant); *Ribes floridum* (Wild Black Currant). Those with nutritious sap and bark: *Negundo aceroides* (Box-Elder); *Populus monilifera* (Cottonwood); *Populus angulata* (Cottonwood).

In addition to the foregoing, already contained in the list of trees and shrubs, I should mention:

Psoralea esculenta (Pomme Blanche des Prairies).—Yields a palatable farinaceous bulb, formerly much used by Canadian voyageurs. Found scattered over dry, gravelly plateaus.

Astragalus caryocarpus (Ground Plum).—Ripe in July. Common on dry, sandy plateaus. Fleshly pod slightly acidulous, quite palatable; said to be improved by cooking.

Allium reticulatum (Wild Garlic); *Allium stellatum* (Wild Garlic).—Both common, particularly the first. Bulb strongly impregnated with the flavor peculiar to the genus.

Fragaria Virginiana (Strawberry).—Scattered on banks of streams; not common.

Helianthus lenticularis (Western Sunflower).—Very common on rich bottom-lands. Cultivated by the Rees, Gros Ventres, and Mandans at Berthold Agency. According to Dr. Matthews, U. S. A., "the seeds are dried, slightly scorched in pots or pans on the fire, and then powdered. The meal is boiled or made into cakes with grease. The sunflower-cakes are often taken on war-parties, and are said, when eaten even sparingly, to sustain the consumer against fatigue more than any other food."

I have not seen any plant of much interest to industry. The prevalence of the *Linum perenne* (Perennial Wild Flax), with its tough textile bark, would seem to hint at the possible successful cultivation of the common flax.

The *Humulus lupulus* (Common Hop), also very common, might perhaps be made profitable.

Ornamental plants, such as would embellish Eastern gardens, are not rare. I enumerate them somewhat in the order of their beauty, and only those special to the region.

Leucrocium montanum.—Lower Yellowstone; opens in May its wax-white, long, slender-petaled blossoms; delicately but faintly fragrant.

Penstemon acuminatum.—Lower Yellowstone. A somewhat peculiar variety of this species, with sky-blue flowers and glaucous, fleshy leaves.

Mentzelia laevicaulis, T. & G.—Pompey's Pillar. Rare.

Mentzelia nuda, T. & G.—Mouth of Sunday Creek; uncommon.

Castilleja affinis.—Snow Mountains.

Castilleja linariaefolia.—Snow Mountains.

Oenothera cespitosa, Nutt. (Stemless Western Primrose).—Common on bad-lands.

Oenothera pinnatifida, Nutt.—The most prevalent *Oenothera* on the Yellowstone Plains.

Oenothera albicaulis.—Prairie; common.

Oenothera serrulata.—Bluffs; uncommon.

Gaura coccinea.—Common.

Gaura parviflora. Rare.—Pompey's Pillar.

Fritillaria atropurpurea, Nutt.—Common on the Yellowstone slopes.

Colochortus Nuttallii, T. & G.—Cedar, Custer, and Sunday Creeks.

Euphorbia marginata.—Common about mouth of Sunday Creek; often cultivated in gardens.

Celastrus scandens.—See trees and shrubs.

Ribes aureum.—See trees and shrubs; often cultivated in gardens.

Shepherdia argentea.—See trees and shrubs.

Elaeagnus argentea.—See trees and shrubs.

Abies Douglasii.—See trees and shrubs.

Yucca angustifolia.—See trees and shrubs.

Phlox subulata (Ground or Moss Pink).—Covers the prairies with bunches of pure-white blossoms in May; common in cultivation.

Of the *Astragali*, the most elegant is, I believe, the *Astragalus triphyllus*, very common on the prairies of the Yellowstone.

TREE-CULTURE.

In closing I wish briefly to state my views in regard to the much-discussed subject of the treelessness of the Western prairies, having had abundant opportunities, during the past summer, to verify the correctness of the various theories advanced. In the first place, the soil of these prairies, being mostly alluvial, does not originally contain tree seeds, and no spontaneous arborescent growth needs be expected simply on upturning it. When such seeds are planted, either by human or natural agencies, the nature of the soil and climatic conditions being generally favorable, they germinate, but, as the young stem issues from the ground, it becomes the prey of adverse circumstances, which prove fatal to its further development. These adverse circumstances may be several, but the main and all-important one is the prairie-fires which, every fall and spring, sweep over immense areas, leaving no vestige of vegetable life above the blackened ground. Grasses and all annual plants may not be injured; their roots remain mostly intact, and they issue from their ashes as green and vigorous as ever in the spring. Not so with trees and all perennials; endowed with a higher organization, the loss of their limbs is severely felt by the roots; these affording more substantial food to the fire are also more deeply burned than in the case of grasses. It follows that whenever a prairie-fire visits outlying groves of ash, box-elder, or poplar, the loss is but very slowly repaired, and after their charred remains become surrounded by a growth of young shoots, a second visitation will probably extinguish their remnant of vitality.

When trees are protected from fires, especially during the first few years, they grow and generally do well; even when shaken by winds and starved by drought, their gnarled and stunted trunks will yet obtain a medium size. Such protection is afforded on bottom-lands, from their position and from the moisture of the soil; also, in the ravines which drain the bluffs and open on the valley bottoms.

In these ravines the capacity of the soil and climate to produce trees is clearly illustrated: The prairie-fire, fanned by the breeze, advances rapidly over the open plateaus; a change of wind will divert its course but not put it out; the moment it reaches the edge of a ravine it seems to hesitate, advances slowly, and soon, no longer fed by the breeze, which is unable to reach it, dies out. In consequence, such ravine is well wooded. Traveling along the Missouri or Yellowstone, one sees large areas of level country totally stripped by fire, then depressions with white grass and brush, and again ravines and gorges, with grass, brush, and groves of trees.

These considerations contain practical suggestions for tree-culture.

It is impossible to prevent prairie-fires, and laborious as well as expensive to protect any place from them in the open plains; therefore it seems logical to seek such places for plantations as are naturally protected, and we generally find these in the bad-lands.

The bad-lands, or at least most of them, are, I believe, susceptible of producing trees. Their suggestive name does not refer as much to the nature of the soil, which is often excellent, as to their irregular, broken, chaotic aspect, and the obstacles which they presented to the march of the hardy Canadian voyageurs who first applied it. I am of opinion that the bad-lands offer very favorable conditions for the successful culture of such trees as grow spontaneously on or near the plains, such as pine, fir, red cedar, ash, box-elder, elm, quaking asp, willow-leaved poplar, alder, and birch.

V. HAVARD,
Assistant Surgeon, U. S. A.

2. JOURNAL OF THE MARCHES MADE BY THE FORCES UNDER THE COMMAND OF COLONEL NELSON A. MILES, FIFTH INFANTRY, IN 1876 AND 1877. BY LIEUT. O. F. LONG, FIFTH INFANTRY, ACTING ENGINEER OFFICER.

SIR: I have the honor to submit the following report of the marches made by the commands under Col. N. A. Miles, Fifth United States Infantry, in 1876 and 1877.

FORT PECK EXPEDITION.

After Colonel Miles's engagement with Sitting Bull near the headwaters of Cedar Creek, in October, the latter had moved northward, and, it was rumored, was encamped on the Big Dry River or one of its tributaries. The authenticity of these rumors was confirmed by the report of scouts who proved, beyond a reasonable doubt, the presence of the Sioux chieftain in that section of country. An expedition was organized, and all the available force that could be spared from the cantonment was brought into requisition to swell the numbers of the command and make it as formidable as circumstances would permit.

November 6.—At 9 a. m. the train reached the table-land on the north bank of the Yellowstone, immediately opposite the cantonment, the ferrying across the river having been commenced the previous day. We cross the small plateau diagonally over a hard road, and passing through the breaks of the creek with considerable difficulty and many delays by reason of the deep arroyos that so frequently cross our trail, finally reach the valley of Sunday Creek. Before midday we cross the creek four times, at the first of which the loose quicksand yields readily to the pressure of the heavy Army wagon, and much trouble is experienced in getting the train through. From this time until camp we pass through the narrow valley of the creek hemmed in by low sterile hills, the sides and top of which are covered with disintegrated igneous rock. Occasionally a little hematite is seen, and in the cut banks of the stream may be traced small veins of lignite of little density or consistence, and which by exposure to the air readily reduces to powder. At 2.30 p. m. we again cross the creek and encamp, having marched 9 miles. In camp plenty of wood, fair bunch and bottom grass, and alkaline water.

November 7.—In the morning at 6.45 we pass up the valley of Sunday Creek, which gradually widens and abounds in sage-brush and cactus. The windings of the stream are more numerous, and before 11.30 a. m. we cross the creek eleven times. At many of the places the cutting of the banks is rendered necessary, and artificial crossings are made. Then passing over a few miles of rolling country, where numerous herds of buffalo are seen grazing on the fine grass that grows here so luxuriantly, we again cross Sunday Creek and encamp on its bank. The day's march is 12.5 miles. The water is very alkaline, wood plenty, and grass good.

November 8.—At 6.40 a. m. we leave the creek on which we encamped last night, and wind among and over the low foot-hills that lead to the Missouri and Yellowstone divide, over a trail that is hard and dry. Vast herds of antelope and buffalo are seen. In many places we pass through drifts of pebble, where the grass which grows so abundantly elsewhere is stunted and sparse. The road is gradually ascending until camp at 1 p. m., when we reach a small creek where the water, intensely alkaline, is found in holes. Buffalo chips are used as a substitute for wood, and the bunch and buffalo grass are fair. Distance marched is 19 miles.

November 9.—Six a. m. finds us again on the march, and for two hours we pass over a fine rolling country, until reaching the top of the main divide the trail gradually descends to the valley of a small branch of the Big Dry River, where poor grass, no wood, and little water are found. From here, passing over a slightly-rolling country and experiencing some difficulty at the crossing of one deep arroyo, at 2 p. m., having marched 20 miles, we encamp on a branch of the Big Dry. It is about 12 feet in width, with running water, slightly alkaline, and plenty of cottonwood for the fires. The grass near camp is of an inferior quality and grows sparsely in the poor soil.

November 10.—Leaving camp at 6 a. m., for 5 miles our road is good, leading over a fine rolling prairie. The landscape then changes and the country becomes diversified and broken. At 8.30 a. m. we cross a large fork of the Big Dry, where good water is found in abundance, and but little wood and poor grass. Soon after we are delayed by the work necessary to make a crossing over a bad arroyo. Continuing through the broken land, at 12 m. the gravelly bed of a large stream with running water is reached and passed. There is no wood in sight along the banks of the stream and the grass continues poor. At 12.30 p. m. a large eastern fork of the Big Dry is crossed. This is the largest stream we have seen since leaving the Yellowstone, about 50 feet in width, with low-cut banks, gravelly bed, and running water slightly alkali. It has a good growth of cottonwood along its banks, but the grass which grows in the sandy soil is thin and scattered. At 2 p. m. we cross this creek again and encamp on its bank, having marched

15 miles. Our scouts, who have been in advance of the command, return and report a small Indian lodge-pole trail 8 or 10 miles in our front.

November 11.—A storm gathered last night, and this morning the ground is covered with snow, completely obscuring the Indian trail. From 6.20 until 8 a. m. our road leads over a rough, broken country, and then emerges in a fine rolling prairie. Here a severe snow-storm greets us and continues all day. We cross several small streams where the water stands in pools, and then over the low divide which separates the creeks, until, at 2.15 p. m., a large running-water stream is reached, on which we encamp, our march for the day being 14 miles. Plenty of cottonwood, and fair bunch and buffalo grass are found here. Indications of the near presence of the Indians grow better as we advance.

November 12.—Early in the morning the command moves up the eastern branch of the Big Dry, crossing and recrossing the stream many times, and passing over a country which, at first broken, grows decidedly bad. Numerous deep ravines cross our road, and many tedious delays are made in passing them. The weather is severely cold and our march is slow and wearisome. At 4 p. m., just before reaching the Big Dry River, we are delayed in making an artificial crossing over the branch of the Big Dry which we have been following all day, and later by cutting a passage through the banks of the river itself. The bed of the river is nearly one-fifth of a mile in width, and much quicksand alternates with the gravel strewn along the bottom. The channel proper is about 20 feet in width, through which flows the clear water at all seasons of the year. From indications of the cut banks, in the spring when the river reaches its maximum depth, it is probably not greater than 5 feet. The country on either side is very broken, much of it being bad land, and high, precipitous, sterile bluffs meet the river at many points along its course. A little scrub pine is seen in the hills, and along the banks of the river there is a fine growth of large cottonwood and occasionally small willow. At 4 p. m. we encamp on Big Dry in a grove of cottonwood, and in a position well sheltered from the severe northeast wind. Our march to-day is 12 miles. The grass in camp is plentiful and nutritious.

November 13.—The weather was extremely cold last night, the mercury indicating 12° below zero. Two parties are sent out to scout the country in different directions. We remain here in camp to-day in order to recruit our stock.

November 14 and 15.—We follow up the Big Dry, passing over its frozen bed, and often experience much difficulty in moving the train through the quicksand so frequently met with. The general nature of the country is the same as described until we approach the Missouri River, when the scenery becomes less dreary and cheerless. The rugged sterile bluffs develop into low rolling hills covered with a fair growth of grass, and the river widens and is more thickly timbered. Continuing up its bed we are soon in sight of the high bluff of the Missouri, and at noon of the 15th encamp opposite Fort Peck, about 1 mile from the Missouri River. Our marches for the two days are, respectively, 23 and 20 miles.

November 16.—The train has been engaged to-day in delivering rations, forage, &c., on the south bank of the river. A long continuous rope, worked by the soldiers, is used in "snaking" the articles across the river, the ice being too weak to support the weight of a loaded wagon.

November 17 and 18.—We remain in camp on the south bank of the Missouri; the weather is very cold, the thermometer indicating 10° below zero.

November 19.—A slight rain falls during the night. In the afternoon Colonel Miles, with six companies of infantry, breaks camp and moves to the north side of the river near Fort Peck. Here we remain for the night. Captain Snyder with the remaining companies of the Fifth Infantry continues in camp on the south side of the river. On the morrow he will retrace his steps up to the Big Dry River, and scout the country in the vicinity of the Black But e. The object of this movement is to force the hostiles northward toward the Missouri River, while we will make a detour and endeavor to intercept them. Fort Peck is located on the north bank of the Missouri River, nearly opposite the mouth of the Big Dry. The log buildings composing the post are situated in an inclosure several hundred yards in length and half as wide, and surrounded by a high stockade. Immediately on the bank of the river it is sheltered from the cold winds by a range of high bluffs which meet the river a short distance below the post. Fort Peck was established, in 1866, as a trading post, by Abel Farwell, agent for Durfee & Peck, and in 1871 the Indian agency, hitherto at Fort Browning, on Milk River, was removed to Fort Peck. The interests of the government are looked after by one company of infantry. It is an agency for the Tetons, Santee, and Yanktonnais Sioux, Canoe Assinibolines.

November 20.—At 6.45 a. m. we ascend the ridge back of Fort Peck, and for four hours move over a slightly ascending and rolling country, growing rich grass, until, reaching a small divide, we pass it and descend to the valley of Willow Creek, a branch of Milk River. Before reaching this stream our road has been over a hard gravelly soil, with rolling prairies on both sides of the trail. We pass the creek with considerable difficulty, and are delayed in cutting our way through its steep banks. Use is made of the

willows that grow so abundantly along the borders of the stream in building the artificial crossing. The country becomes more sterile and barren as we continue up the creek. Low hills break away to the right and left. The soil is less coherent and more alkaline, and a rank growth of cactus and sage-brush everywhere greets the eye. At 4.15 p. m., after marching 27 miles, we encamped on Willow Creek, where good water, slightly alkaline, and sufficient grass and wood are found.

November 21.—The weather has grown more severe, and cold winds prevail. We start at 6.15 a. m., and all day the creek on which we encamped last night is kept in view. The country is rugged and barren, in fact a sterile desert. No living thing is seen; even vegetation dies for want of nourishment. On every side is the appearance of some vast igneous action; chloritic and feldspathic rock, mica, gypsum, and hematite are seen cropping out of the dark cone-like hills. We cross numerous deep arroyos where much fatiguing work is necessary to make a roadway, and finally, at 1.30 p. m., encamp on Willow Creek, near a bunch of cottonwood, where a little strongly alkaline water is found standing in pools. The grass grows sparsely and is of a poor quality. Our march to-day is 19 miles.

November 22.—Leaving camp at 6.30 a. m. our road is through a broken country similar to that we passed yesterday. Willow Creek is seen to the north of our trail, winding among the low foot-hills where it takes its rise. Passing over a few miles of low rolling country through a drift of rounded pebble which everywhere covers the surface of the ground, we soon reach a tract of country where the hills develop into small mountains with sides covered with grass and tops crowned with large granite bowlders that balance in the wind. Winding through this small range we pass over rich alluvial deposits, covered with a fair growth of grass, and at 4 p. m. encamp on the "creek on which the women were killed," having marched 19 miles. Here we find fair grass and very poor water. As a substitute for wood sage-brush is used.

November 23.—We break camp at 7 a. m. and for an hour experience difficulty in making a roadway over the numerous arroyos that cover our trail. Soon we enter a beautiful valley, about one mile in width, nestled among the low hills. Passing through this valley over a good trail, and crossing again the creek on which we encamped last night, about noon we enter the valley of the Fourchette, the waving grasses of which furnish food to the herds of buffalo and antelope that graze about. The valley is about 2 miles in width. The soil, rich and loamy, is covered with the most nutritious grasses of vigorous growth and luxuriant. When open for settlement there is no question about the future of this valley as a favorite stock region, for undoubtedly it is capable of furnishing pasturage for immense herds of cattle. To the south of the valley a pine-covered ridge stands out prominently. At 4 p. m. a dry camp is made in the valley near some scattered drift-wood. The distance marched is 19 miles.

November 24.—We move out at 6.15 a. m. and soon cross Fourchette Creek near its headwaters. We pass over low rolling hills, covered with a rich growth of grass, and crossing the creek again follow its course over a fair trail until camp at 12 m., having marched 12 miles. The water in the creek is alkaline, and cottonwood grows along the banks of the stream.

November 25.—Leaving camp at 6.25 a. m. for 4 miles our road is poor, many arroyos and small ravines delaying the progress of the train. Captain Bennett with a detachment of 50 men proceeds from this point to Carroll in order to make inquiries regarding the unlawful sale of ammunition, said to have been made by the trader at that point to hostile Indians. The trail now is gradually ascending over gravelly soil and leads to the high Missouri bluffs, a few miles distant. A slight rain falls and renders the road quite heavy for the remainder of the day. Reaching the bluffs of the Missouri, we follow their windings for several miles until a point is reached from which we are able to descend to the valley of the river. Here we encamp on the thickly-timbered bank of the Missouri in a small opening of the wood, where the rich grass affords sufficient food for our stock. The march to-day is 15½ miles.

November 26.—Last night the snow fell to the depth of several inches. We expected to have found the river frozen, but arriving here find it open and filled with floating ice. Logs were collected, drawn to the river's edge and a raft constructed. Wagon-boxes covered with canvas and propelled by rudely shaped oars are also brought into requisition. A band of elk and several deer leisurely strolled into camp during the afternoon, and eight of the former and three of the latter are secured.

November 27 to December 1.—During this time we build another raft and pass a rope across the river to be used for ferrying purposes. At its narrowest point the river is at least 150 yards in width, and filled with anchor ice. The current is very rapid, and the crossing will prove to be a dangerous and hazardous undertaking. Trees are felled in the river higher up, in order that a gorge may be formed, but without success. Several scouts are crossed to the south side of the river, and dispatched in the direction of Captain Snyder's command. The project of crossing the river with the rude means at our disposal is considered to be impracticable and preparations were made to move on the morrow farther up the river, hoping there to find it frozen.

December 1.—From information received, the commanding officer sends Lieutenant Baldwin and two companies of infantry to Fort Peck, while with the remaining portion of the command he moved in the direction of Fort Hawley. Starting at 10 a. m., we are delayed two hours in gaining the top of the high ridge immediately in rear of camp. From this point the trail is over a rolling country until 5 p. m., when we reach the headwaters of a small creek. We attempt to pass through the low pine-covered hills, which narrow the valley of the small creek, but the country is too broken. Continuing down its valley we cross and recross the creek many times. Often the train takes the bed of the stream, and frequently it is delayed by the quicksand. At 9 p. m. we reach a creek 40 feet in width, water in pools, and considerable cottonwood along its banks. Here we encamp near the Missouri River, after a tiresome march of 19 miles.

December 2.—At 7.15 a. m. we leave camp, and skirting the low hills that run parallel to the river, soon reach its bank, but not before the expenditure of much time and labor in cutting a roadway through the thick growth of underbrush which at this point extends several hundred yards back from the river. A passage way is soon made through the cut banks, and crossing the river on the ice we soon reach old Fort Hawley. Here we see what remains of the trading-post, long ago abandoned. A few pieces of burnt timber scattered about, the remnants of an iron stove, and several graves marked by wooden headboards, are all that is left. Passing from here we are occupied until dusk in reaching the top of the high bluffs back of the old fort, and this is accomplished only by the most severe exertion. From the top of the ridge we obtain a fine view of the river-valley, and for miles can follow the beautiful sinuosities of the Missouri, and plainly see the Little Rockies, 40 miles distant to the northward from camp. Our day's march is $3\frac{3}{4}$ miles. Good grass and water in camp. Red cedar is used for fire-wood, and is abundant in the bluffs.

December 3.—Leaving camp at 6.30 a. m. our road is fair until we reach the valley of Crooked Creek. In the morning we pass through a country of rolling hills, occasionally broken, and covered with a growth of fine grass. In the valleys and ravines, as well as on the summits and sides of the hills, the yellow pine and red cedar thrive, softening the rugged outline of the hills, and lending depth and shape to the naked glen in the farthest recess of which the deer finds a safe retreat. Crooked Creek well deserves its name. Winding interminably through its narrow sterile valley, it has a bed 30 feet in width, with much quicksand and little alkaline water. The bluffs on either side are high, grow a little scattered pine, and serve to conceal the broken country that extends many miles farther back. We pass down the valley of the creek, which is crossed many times, and at 1.45 p. m. encamp on its bank, after marching 13 miles. In camp fair buffalo-grass, some cottonwood, and poor water.

December 4.—We start at 6.30 a. m. and continue down Crooked Creek until 10 a. m., crossing numerous ravines and passing over a very bad road until, leaving the valley of this stream, we emerge into that of the Musselshell, near the mouth of the river. Here we met Captain Bennett and his detachment. The valley of the Musselshell is about 1 mile in width and is covered with a sparse growth of bottom-grass and much cactus and sage-brush. The high bluffs are on both sides. Toward the east they break away into bad land and toward the west into broken country. Much scattered pine grows in the bluffs and ravines, while the valley is abundantly timbered with large cottonwood. The river, about 100 feet wide, has running water and a gravelly bottom, with small willows growing thickly along its banks. We continue up the valley of the river for 2 miles, and at 11 a. m. encamp in a grove of cottonwood on its bank, having marched $6\frac{1}{4}$ miles. In the valley deer are plenty and many are secured.

December 5.—Scouts having been sent to find a wagon-road through the bluffs on the east side of the river, report that it will be impossible to get a train through. At 6.45 a. m. we break camp and retrace our way until Crooked Creek is reached and crossed. Directly after, we cross the Musselshell on the ice near its mouth, and passing close to the foot of the high cut bluffs of the Missouri soon reach a point near Squaw Creek, opposite our camp of November 25. Here much time is occupied in cutting a roadway around the foot of the precipitous bluff, and farther on, in order to reach the level ground above, the wagons are unloaded and mules unhitched, and both the wagons and their contents are dragged up the hill-side by men. We encamp near here on the south bank of the Missouri, where good grass, water, and plenty of cottonwood are found. The distance marched to-day is 7 miles.

December 6.—At 5.30 a. m. we break camp and, crossing to Squaw Creek, enter its valley, up which we move over a fair trail, passing over the gravelly bed of the creek many times before reaching camp at 2 p. m. The creek flows through a well-wooded valley about half a mile in width, which gradually contracts as the bluffs on either side become higher and more precipitous. In the valley fair grass and cottonwood are found, while the bluffs and ravines grow an abundance of pine and cedar. No quicksand met with in the creek, and the water standing in pools is strongly alkaline. Our march to-day is $16\frac{3}{4}$ miles.

December 7.—The branch of Squaw Creek that we are following becomes smaller and much more winding; the high bluffs confine it more closely, and it is a work of labor

and a trial of patience to guide the train in the intricate turns of the stream and among the huge boulders scattered profusely in the valley. At 12 m. we leave the creek, and passing over some rolling country, which is gradually ascending, reach camp in a position sheltered in part from high winds but away from water. Fair grass and plenty of pine and cedar are obtained. Our march to-day is 12½ miles.

December 8.—At 7.30 a. m. we leave camp and move over a rolling country similar to that passed over yesterday afternoon. Many arroyos are met with, and much sagebrush and little grass grows in the hills. At 8 a. m. about 1½ miles to the east of our trail is seen a small stream with but little timber on its banks and no water in its bed. We follow down this creek to its junction with a larger stream, and at 3 p. m., after marching 18 miles, encamp near its mouth in a small bunch of cottonwood. The grass is very poor. The stream on which we encamp is small, with little standing water and deeply cut banks, and is a branch of the Big Dry River. The weather to-day has been extremely cold, its severity being augmented by a bitter northeast wind. As a consequence there is much suffering in the command, many of the men having frozen their extremities. Black Buttes are plainly seen from camp at a distance of 20 miles.

December 9.—Starting at 6.30 a. m. for two hours we pass over a broken country and reach a small branch of the creek we camped on last night. There is but little wood on its banks and no water in its bed. Passing from here our trail continues over broken ground that extends many miles to the west, while toward the east the country is more open, and appears to be low and rolling. At 12 m. we reach and cross a branch of the Big Dry, and an hour later another smaller stream which joins the latter a few miles to the east of the trail. No wood is seen on either of these streams, and the water is slightly alkaline. Continuing onward we pass over a high rolling tract of land, and at 3 p. m. make camp after having marched 18½ miles. No wood or water near camp, and the grass that has been so poor during the day is no better in camp.

December 10.—We start at 6 a. m. and move over a high, rolling country of the same general characteristics as that passed over yesterday afternoon. At 8.30 a. m. quite an important divide is crossed, and we descend to the low rolling country beyond. Buffalo in large herds are seen on all sides grazing on the rich grass that here grows in abundance. At 12 m. we come to a small fork of the Big Dry, cross it several times, and following the course of the stream at 3 p. m. encamp on its banks. No wood, but plenty of water and poor grass are obtained. The march to-day is 19 miles.

December 11.—Leaving camp at 6 a. m. our road is over a low and slightly-rolling country which extends many miles to the east and west of our trail. At 8 a. m. we cross a small branch of the stream we camped on last night. No wood is seen along its course and the standing water is alkaline. Plenty of buffalo and antelope are grazing about. Our trail continues good until camp, which we make on the prairie, where there is no wood or water, but an abundance of good grass. Distance marched 18½ miles. Scouts arrive to-day from the cantonment Tongue River and report the arrival there from the agency of 80 Crow scouts. They also report the hostile Cheyenne Indians as having driven off some cattle that were grazing near the post.

December 12.—Snow fell to the depth of several inches last night. Break camp at 6.30 a. m.; the country, at first rolling, becomes somewhat broken, and is intersected frequently by deep arroyos. We cross many small branches of Sunday Creek, in several of which a little alkaline water is found standing in pools. No wood is seen along their banks, and their general direction is southeast. A severe snow-storm comes up at noon and lasts all day. We find Captain Snyder's trail which leads to the main branch of Sunday Creek, and follow it, making camp at 8 p. m. Here wood and water are plenty, and the grass, though growing sparsely, is good. The distance marched to-day is 23½ miles.

December 13.—Several days previous to reaching this camp our forage had given out, the rations were getting low, and orders were sent to the cantonment to have a train with the necessary supplies meet us at this point. As expected, it arrived this morning. At 1.45 p. m. we continued down the valley of Sunday Creek, passing over the same trail we made going out on the campaign, a description of which has already been given. After marching 9 miles, at 4 p. m. we encamp on Sunday Creek.

December 14.—At 6.35 a. m. we move out of camp toward the cantonment, over the trail that was made in November last, and at 12 m. reach the north bank of the Yellowstone, opposite Tongue River, after a march of 12 miles. We learn that Captain Snyder and his command have preceded us by several days, having thoroughly scouted that section of country in the vicinity of the Black Butte and the headwaters of the Big Dry. Lieutenant Baldwin, who was detached from the command while it was in camp on the Missouri near the mouth of Squaw Creek, arrived at the cantonment December 22. From the Missouri he had proceeded to Fort Peck, thence following the north bank of the river crossed the latter near Wolf Point, and gaining the Redwater followed up its course until December 18, when he came upon the Indian village of Sitting Bull. With the little command of 100 men he at once attacked it, drove the hostiles from their village, and took possession. In the haste of their departure they abandoned everything except their ponies and children, and were left

without shelter to the cold mercy of a Montana winter. The lodges and Indian trapings were burned, and with the captured ponies, 40 in number, Lieutenant Baldwin reaches the cantonment four days later. During their march from the Missouri to the Yellowstone the weather was most severe. Deep snow impeded the progress of the troops and the cold was intense, the mercury sinking to more than 40° below zero.

The total march of the command under Colonel Miles is 430 miles. The march of Lieutenant Baldwin from the time he was detached from the main command until he reached the cantonment is 328 miles.

No itinerary was kept of Captain Snyder's or Captain Bennett's movement.

WOLF MOUNTAINS EXPEDITION.

Rumors were rife that a number of hostile Indians were encamped somewhere to the south of the cantonment, but just where could not be definitely ascertained. One night, however, a few Cheyenne Indians dashed in among the herd of cattle and drove off 250, the trail leading up the valley of Tongue River. This was an opportunity not to be lost to the military. The cattle were evidently intended for a large camp of hostiles, suffering for the want of food, and in a country where game was scarce, the exact location of which was not known. By following the trail of the cattle-thieves we would probably soon reach their objective point. An expedition is hastily organized, Col. N. A. Miles commanding, and consisting of portions of the Fifth and Twenty-second Infantry, in all numbering about 200 men. The morning of the 29th of December, 1876, is cold and cheerless, the thermometer indicates 30° below zero. A burden of snow covers the ground, rests on the spreading branches of the trees that line the river's bank, and wreathes every stem and bough with fairy festoons of the most exquisite design. The train starts early from the cantonment, crosses Tongue River twice on the ice, and after a march of 11½ miles, crosses the river again just previous to making camp at 2.05 p. m. The valley is well timbered with cottonwood along the line of the day's march, and high sterile bluffs hem it in on either side. About 6 miles from the cantonment Tongue Buttes stand prominent among the surrounding bad lands on the east bank of the river. The valley averages 1 mile in width, and underneath the snow good, nutritious bottom grass is found. The next day's march takes us 17 miles farther south, we pass the river ten times and experience no difficulty at any of the crossings by reason of wagons breaking through the ice or the treacherous quicksands. One mile from camp we reach and cross Four Horns Creek. It was named by the Indians, and is an eastern branch of Tongue River, small, winding, with cut banks, no running water, and but little wood. A short distance farther on Pumpkin Creek is crossed. It is one of the largest of the eastern branches of the river, with running water, gravelly bottom, and low cut banks. Breaking camp the next morning at 6.15, our route lay nearly to the southwest through the valley of the river, which gradually widens and crosses the latter four times. Small yellow pine is scattered here and there in the bluffs, and the grass still continues good and plentiful. January 1, 1877, we continue our march up the valley of Tongue River. The weather has moderated, and a fine drizzling rain falls during the day, making the road poor and the progress slow. The nature of the valley is gradually changing. The line of bluffs on either side draw nearer to each other and contract the valley, the grass of which is much less abundant and nutritious. The soil is of little value; deep ravines are frequently met with, and everywhere there is a rank growth of cactus and sage-brush. We cross the river many times during the day, and just before reaching camp our scouts, a short distance in advance of the command, exchange a few shots with a small war party of Sioux Indians. A skirmish-line is quickly thrown across the valley and on the high commanding bluffs to our right. Everything is made ready for a fight, but in vain, for soon the Indians are seen on the ridge crossing the river, at least 2 miles away and fast increasing the distance between us. It is useless to pursue them, for we have no cavalry. In the morning our course leads us a short distance away from the river where the rugged, precipitous hills and deep arroyos delay the progress of the train. The nature of the valley is similar to that already described. We pass the site of an old Indian camp and cross several small fresh trails, made probably by the Indians we saw yesterday.

Reaching the valley again, we cross the river four times, and in consequence of the poor condition of the animals make camp after a short march of 5 miles. The next day, January 3, we break camp at daylight, 6.30 a. m., and continue up the valley. Scarcely is the command out of sight of the camp of last night before fifteen or twenty Cheyennes swoop down from their place of concealment in the bluffs close by the river and succeed in killing one of the two soldiers left behind to secure some of the cattle that had strayed away during the night. At the noise of the firing a company hasten to their relief, but arrive too late to be of service. Our course has been nearly south to-day, and, as in the previous day's march, high hills and deep ravines retard the train.

At 8 a. m. we pass Turtle Creek, named by the Indians. It is a small stream flowing from the east, and winds among the pine-covered hills as far as can be seen. At

noon to-day we make camp, having lost much time in making a roadway among the dead cottonwood that is found scattered about in this part of the valley. We cross the river once to-day, and the ice, made weak by recent rains, will scarcely support the weight of our heavily-loaded wagons.

In the morning at 7 we continue the advance, passing over a trail which in dry weather would be good, but now by reason of excessive rains and melting snow is rendered heavy.

We cross the river six times before making camp at 3.15 p. m. near the mouth of Otter Creek. A cold, continuous rain falls during the day, making it exceedingly disagreeable for men and animals.

Otter Creek is a stream of the third order, and almost as large as Tongue River itself. Its valley is quite wide and well wooded, and the running water flowing over a gravelly bed is but slightly alkaline and very clear. This creek is well known to the Indians, and the large, well-worn trails running through its valley testify to the use they have made of it when passing from the south to the north on their hunting expeditions or predatory excursions.

January 5.—At 7.30 a. m. we are again on the march. The valley begins to narrow and the windings of the river are much more frequent. High cut bluffs meet it and render frequent crossings necessary. Sandstones and shales occur in large quantities in the bluffs, and occasionally is seen a slight sprinkling of hematite. Many artificial crossings of the river are rendered necessary, and until noon the march is slow, tedious, and difficult.

Continuing up the river valley, we soon enter Wolf Mountains, the snow-capped peaks of which tower above us to the height of several hundred feet.

The deep cañon of the mountains meeting the valley break away into ravines, and these in their turn become as ramous as the roots of a tree. The valley is covered with drift containing many beautiful specimens of quartz. Again we are visited with a severe and continuous rain, making the road heavy and everybody uncomfortable. Early in the afternoon we pass through a large Indian camp more than a mile in length, with every indication of its recent occupation. At 5 p. m., after marching 14½ miles, we make camp.

Moving out of camp at 7.30 a. m., we follow up the valley of the river, crossing the latter four times, and each time with considerable difficulty cutting away the banks to facilitate the crossing, and in several instances the weakened ice to make a ford. A blinding snow-storm commences early in the morning, lasting all day, and through this the little command moved undauntedly, endeavoring to lessen the distance between it and the hostiles. At 2.50 p. m. Hanging Woman's Creek is reached. It is an eastern branch of the river, quite large, with running water and a valley half a mile in width, well wooded as far as the eye can reach. At 4 p. m. we encamp, having reached 15 miles. The grass in the valley is better, being more abundant and nutritious. A little ash is interspersed with the cottonwood along the banks of the river, and plenty of yellow pine is seen on the mountain-side and lining the ravines. We pass to-day through several large Indian camps, in the last of which a few emaciated Indian ponies are quietly grazing. The fires are still smoldering, and many lodge-poles and Indian trinkets lie scattered about. We infer from this that the camp is aware of our presence, has been moving slowly, and is but a short distance in advance of us. Soon darkness comes, and the snow continues falling, while the cold is intense, the mercury sinking many degrees below zero.

January 7.—At 7.30 a. m. we continue the advance, cross the river three times, and experience so much difficulty in making headway that we encamp after 12 m., having marched but 2½ miles. Our scouts, who have been in advance of the command, return, bringing with them eight Cheyenne captives, among them two young bucks, with ponies, lodges, and all their paraphernalia, having captured them a few miles in our front. Again they were sent out on a scout, with instructions to locate, if possible, the Indian camp. At dusk firing was heard up the valley, the companies were quickly deployed as skirmishers around the camp, and the colonel commanding, taking three companies and a piece of field-artillery, moved forward to the relief of his scouts. Indians were seen riding around the hills on both sides of the valley, and the firing still continued. The assistance had arrived none too soon, for the brave scouts, having been corralled by more than 100 Indians, had taken to the brush, and were fighting against heavy odds in true frontier style. They were soon released from their precarious situation uninjured, but several of their horses were killed in the skirmish. Orders were given to have the pack-train in readiness for the morrow. Daylight on the morning of January 8 revealed to us the close proximity of the Indian camp, and the position we occupied with respect to it. The broad bottom-land of the valley, extending several miles in our front, is broken here and there by the windings of the river and the groves of cottonwood. Wolf Mountains on both sides of the river and a short distance from it break into ranges of hills which extend to the valley and are perpendicular to it. Immediately in rear of camp is a high cut bluff, commanding an extensive view of the valley in front and the low hills in rear of camp; but this, in

its turn, is commanded by several higher points farther back and nearer the mountains. The fight commences at 7 a. m. The Indians, confident of their strength, attempt a charge down the valley, but the display of several companies of infantry, deployed as skirmishers across the bottom, deters them from another similar effort. Our artillery is brought into requisition: the brass piece is placed in the valley, and the 3-inch Rodman on the bluff back of camp is supported by several companies of infantry. We command the valley, and it is not long before the Indians realize the fact and change their tactics accordingly. They are seen riding on the hills all about us, and their shrill war-whoop is answered by the roar of artillery. Soon they become bolder and attempt to take the high hills back of camp; but, anticipating their movements, we are there before them. Farther to the rear, however, they had succeeded in gaining possession of three high points, and in dislodging them from these commanding positions the most severe fighting of the day occurred, one company in particular engaging the Indians at a distance of not more than 50 or 75 yards. At 12 m. a severe snow-storm terminated the action, and the firing, at first so sharp, soon became desultory, and finally ceased altogether. Our loss was 1 killed and 8 wounded, one of the latter dying on the return march. The Indian loss is unknown, but must have been considerable, for at several of the points where the fight raged the fiercest the snow was dyed with blood. At 5 p. m. our camp is moved to the high bluff, affording better shelter from the storm and being stronger in a military sense. The night is very severe, the weather moderates, and the snow is relieved by a heavy fall of rain, which lasts until morning.

January 9.—Leaving the wagons in charge of a guard, the command moves up the valley, the line extending entirely across the bottom-land and reaching to the top of the bluffs on the right and left. We pass through the Indian camp only recently deserted, and continuing up the valley cross the river several times, until, gaining a high point several miles beyond, we obtain an extensive view of the country in our front, a thorough inspection of which reveals no Indians. Returning, we reach camp at dusk. Our stock is very much exhausted, and the rations are getting low; so, early in the morning of the 10th of January, we commence the homeward march, and for nine days pass down the valley of Tongue River, much of the way moving over the trail we made coming out. The weather during most of the time is very severe, heavy snow-storms prevailing, and the mercury in one instance sinks to 35° below zero.

We reached the cantonment mouth of Tongue River at 12 m., January 18, having marched 242 miles and crossed the river more than 100 times. It is safe to assert that the result of this fight with Crazy Horse and his confederated bands of hostile Sioux and Cheyenne Indians was seen in the surrender of this chieftain and his Sioux and of the Cheyennes. The latter surrendered to Colonel Miles at the cantonment, and numbered more than 300.

LAME-DEER CAMPAIGN.

Many disaffected families of Indians who had alienated themselves from their people at the different agencies had united under the leadership of Lame Deer, a Minneconjoux Sioux, and were supposed to be encamped on the Rosebud, or one of its tributaries. All were renegades, and represented the very worst element of their different tribes. This campaign had for its object a movement against these Indians. The troops engaged were one battalion of the Second Cavalry and portions of the Fifth and Twenty-second Infantries, under the command of Col. N. A. Miles, Fifth Infantry.

Starting from the cantonment mouth of Tongue River early on the morning of the 1st of May, 1877, we moved up the valley of Tongue River over the same trail as that passed over in January last on the Wolf Mountains campaign, a description of which has been given in the report of that movement. On the morning of the 5th of May, after having marched 61 miles, we reached the mouth of the pass through the divide that separates the valley of Tongue River from that of the Rosebud. Leaving the infantry to guard the train, at 2.30 p. m. Colonel Miles started with the battalion of cavalry and packs. We move through the pass over a fair trail and gradually ascend to the top of the divide. The high hills on both sides of the pass are covered with an abundance of yellow pine, while the pass itself has a fair growth of good grass. Descending from the divide, we cross a dry branch of the Rosebud and soon after the creek itself, where a short halt is made to water the stock. Our march thus far is 8½ miles. The valley of the Rosebud at this point is from one-half to three-quarters of a mile in width. Plenty of running water in the stream and cottonwood in abundance. The creek probably derives its name from the luxuriant growth of rose-bushes along its banks. Passing up the valley of the Rosebud for 3 miles, we enter that of a small western branch of the stream, which winds among the hills and is sparsely wooded, and for one hour continue in its valley. Through the darkness we march, at first encountering a little bad-land, and then moving over a rolling country intersected by coulees, until 2.30 a. m. on the morning of the 6th, when we bivouac on a small stream among the low hills, where no wood, but little water, and poor grass are found. Our estimated march for the day is 40 miles.

At 9 a. m. we move up the valley of the creek, the head of which can be seen near the foot of a high pine-covered ridge in our front. Reaching the top of this ridge, we obtain a fair view of the surrounding country. A small creek winds around its foot on the northern side, and at 2 p. m. we rest for four hours on the bank of this stream, in order that the stock may graze. Leaving this creek, for three hours we pass through a sterile, broken country, and then bivouac for the night on a small western branch of the Rosebud. Every precaution is taken lest the presence of the command be discovered; the horses are well hidden in the valley and no fires are permitted. Our march for the day is 16 miles.

May 7.—At 2 a. m. we are again on the march, and pass over a country which at times is quite rugged. Several small streams are crossed, in the last of which the water is in deep pools and plenty of cottonwood grows along its banks. At 4 a. m. we reach the valley of the Rosebud near the mouth of the Little Muddy. The first streak of daylight reveals to us the Indian village in the valley of the latter stream and about 5 miles distant. The smoke of last night's camp-fires still hovers over the lodges of the sleeping Indians and a large herd of ponies are seen grazing close to the village. A searching survey of the surrounding country is quickly made and the plan of attack of the colonel commanding is formed. Lieutenant Casey, Twenty-second Infantry, leads 20 scouts down the valley to the charge through the Indian village. He is closely followed by one company of cavalry, and together they secure the pony-herd and guard it. Two companies of cavalry are dispatched to the hills to prevent, if possible, the escape of the Indians, while the remaining company is held in reserve in the captured village. A small pine-covered ridge is on the west side of the valley, and from the ravines and behind the boulders which cover its top a dangerous fire is poured in on us by the lurking Indians. Leaving one company to guard the ponies and hold the village, the others dismount, gain the top of the ridge, form a skirmish line, and drive the Indians from their hiding-places. It is 9 a. m. before the cavalry return to the village, and preparations are made to encamp in the valley and await the arrival of the infantry. More than 450 ponies are captured, all in excellent condition, and the surprised Indians had left everything except their rifles. A few of these, even, and some ammunition are found. Tons of dried buffalo meat, several hundred Indian saddles, and bead-work in profusion lie scattered about the village. Seventeen dead Indians are counted in and around the village; Lane Deer, the chief, being among the killed. Our loss is four killed and eight wounded. Early in the afternoon part of the infantry arrived, having left the train in camp on the Rosebud. The Little Muddy is an eastern branch of the latter stream, and winds through a beautiful valley, on both sides of which are high hills thickly covered with pine. In the bottom the grass is excellent, and no better location for an Indian camp could anywhere be found. The Little Muddy has deep-cut banks, running water, and much quicksand. A little scattered cottonwood is found along its banks. Several picket-posts have been placed on the high ridge, and during the afternoon and night a little desultory firing occurs at these points. In the morning the lodges, dried buffalo meat, saddles, and Indian trappings of all kinds were collected in piles and burned, and the bodies of the dead buried.

At 10.30 a. m. we move down the valley of the Little Muddy to its junction with the Rosebud, and then continuing down the valley of this latter stream, at 2 p. m. encamp on its banks after marching 8 miles. The valley of the stream at this point is one-half of a mile in width, hemmed in by high, sterile, and in places precipitous bluffs, growing scattered pine. The grass, wood, and water in camp are good.

At 7.25 in the morning we break camp and continue down the valley of the Rosebud, and after marching 12 miles, at 11.30 a. m. reach the camp of the infantry that were left behind to guard the train.

May 10 we remain in camp, and the following morning resume the return march, reaching the crossing of the Rosebud at the mouth of the pass at a distance of $1\frac{1}{2}$ miles from the camp of last night. From this point we pass over the same trail we made coming out, and at 11 a. m., May 14, reach the cantonment. The total number of marching days is 13 and the distance marched 209 $\frac{1}{4}$ miles.

BEAR'S PAW EXPEDITION.

This movement had for its object the interception of the hostile Nez Percés Indians under Chief Joseph; and in the successful endeavor to prevent this band from forming a junction with Sitting Bull, this command moved over a country much of which had not been traversed before by the military and upon the nature of which no reports had been made.

September 18.—At 10.30 a. m. leaving the north bank of the Yellowstone opposite the cantonment mouth of Tongue River, Montana Territory, we pass over the small tableland between the Yellowstone River and Sunday Creek, and descending to the valley of the latter stream through low hills that skirt the tableland and form the breaks of the creek, we follow its winding course into camp, which is reached at 5 p. m. Much difficulty was experienced in the crossings of the creek, the treacherous quicksand

causing many tedious delays to the train. This valley is not very extensive; several hundred yards in width, and covered with a loose gravel mixing with the soil, it can scarcely be called fertile, for there is nothing in the surrounding earth that vegetation can absorb into its tissues for nourishment. The grass over the line of to-day's march is poor in quality and of little variety, bunch and bottom grass predominating. The water in the creek, dark in color and highly alkaline, now lies quiescent in pools, forming a strange contrast to its appearance in the spring months, when deriving strength and volume from the melting snow, it sweeps through the valley with the force of a mountain torrent, and at that time is not fordable. The cottonwood which grows along the banks is not continuous but in isolated groves, and at a distance gives to the stream an appearance of being well timbered. The distance marched during the day is 17.61 miles.

September 19.—At 5.15 a. m. we continue our march up the valley of Sunday Creek and experience no little difficulty in guiding the train around or across the numerous coulees that cut our road at short intervals. The country on either side of us, which in early morning was broken, now develops itself into the genuine *mauvaises terres*. As we approach the headwaters of this branch of the creek the wood entirely disappears, and nothing but the sterile, varicolored, cone-like hills of the bad-lands can be seen. On every side of us is the evidence of some vast igneous action. From mechanical causes many of the huge masses of unstratified rock have become disintegrated and lie broken at the foot of the low hills. Feldspathic, trappan, and volcanic rocks are seen scattered about with trachytic and dark-colored basaltic lava, with the porous pumice-stone or the glass-like obsidian. During the rainy season our trail of to-day would be quite impracticable, for the soft alkaline earth would yield too easily under the pressure of a heavily-laden army-wagon. Having marched 16.93 miles, we encamped on a small dry fork of Sunday Creek, and by sinking several wells in its bed secured a little water, very alkaline. No wood could be obtained, and buffalo chips were used as a substitute. A few antelope, buffalo, and black-tailed deer were secured. In camp, gumma and buffalo grass are in sufficient quantity for the stock.

September 20.—Starting at 5.15 a. m., our trail crosses several small forks of Sunday Creek, in which a little rain-water in pools is found, and at 7 a. m. we emerge in a fine valley 2 miles in width, through which courses the main branch of Sunday Creek. The grass here does not grow with that lavish luxuriance that the dark loamy appearance of the soil would indicate, and cottonwood some 8 miles below is seen thinly scattered along the stream, which at this point has low-cut banks and is free from water, even in pools. From the time of entering the valley our road is greatly improved and continues good as we pass over the gently-sloping foot-hills of the great Yellowstone and Missouri divide, growing in abundance rich and nutritious buffalo and bunch grass. Large game-trails cross the country in every direction, and buffalo and antelope in great numbers are quietly grazing on each side. At 9.10 a. m. we came to the main divide, from which is obtained a most perfect view of the varied and extensive scenery of the surrounding country. To the east, the gently-sloping hills of the divide are lost in the far distance; to the south and west can be seen that mass of bad-land which, hemmed in by Custer and Sunday Creeks, stretches north from Yellowstone 60 or 70 miles; to the west and south of our trail some 8 miles is Sunday Butte, whose dark truncated head towers far above the surrounding hills; in our front, toward the north, the divide falls precipitously in alternate broken and bad-land. Passing through this dreary waste, free from water, wood, and good grass, we go into camp at 7 p. m. on a small fork of the southern branch of the Big Dry, where we obtain drift-wood sufficient for our fires, and for our animals buffalo and bunch grass, though not in abundance. This stream has cut banks and the water found in pools is strongly alkaline. The distance marched to-day is 30.90 miles.

September 21.—Soon after breaking camp we came to the first running-water stream since leaving the Yellowstone, the southern branch of the Big Dry, with fine gravelly bed, clear running water, slightly alkaline, but no driftwood or timber in sight. At the point of crossing it is about 40 feet in width, and the country adjacent is somewhat broken and cut by arroyos. Our course leads us over the high divide that separates the waters of the southern from those of the eastern branch of the Big Dry, where timber is wanting and the impure alkaline water stagnates through evaporation. An hour later we make camp on the eastern branch of the Big Dry, in the midst of a broken country, with soil that affords nutriment only to the sage-brush and cactus, that thorny plant of fantastic appearance, with flowers of red, purple, and yellow, so cultivated in the conservatory, and such a scourge on the prairie, by reason of the pain its spines inflict on the animals that pass through it. After marching 23.13 miles, through force of necessity, we encamp on a stream 20 feet in width with gravelly bed, the water of which is permanent and slightly alkaline. No wood or timber is found, and the grass, growing in isolated spots, is poor.

September 22.—Leaving camp at 4.45 a. m. we pass through a broken country, and for 15 miles our road winds around and over the barren hills crossing and heading numerous arroyos and ravines, until, at 10.45 a. m., we reach and pass a well-wooded

stream with cut banks and rain-water in pools. This is Spring Creek, which flows to the northeast through a rolling country as far as the eye can reach. To the southeast, and about 10 miles from our trail, Black Butte stands prominently projected against the horizon. A short distance on we experience a little difficulty in crossing a dry branch of this stream, which, like Spring Creek, is timbered with cottonwood and forms a junction with it a few miles below. Passing from here, the road ascends gradually through a rolling country, somewhat broken on either side of our trail, until reaching a high divide which separates the waters of the creeks passed during the day from those of Squaw Creek, it soon reaches a point where the divide falls almost precipitously, and is lost in a confusion of bad lands. Darkness comes, and groping our way through these *mauvaises terres* we follow the tortuous course of a small fork of Squaw Creek, which flows westward through a narrow valley hemmed in by high and rugged hills clothed with pine. Finally we make camp at 10 p. m., after a weary and fatiguing march of 35.83 miles. Pools of alkaline water are found, and cottonwood grows in abundance along the banks, where is found grass of a very fair quality.

September 23.—The morning discloses the wild and picturesque scenery by which we are surrounded on every side. Towering above us to the height of several hundred feet, the rugged sandstone bluffs, beautifully tinted by the alkaline constituents of the soil, and the different colored strata are somewhat relieved by numerous deep ravines clothed with pine. Reaching the summit of one of the highest of the bluffs, we see that they break away to the north and south in a bad-land waste. The only course open to us is to follow the sinuosities of the creek on which we encamped last night; and picking our way through the huge masses of rock that have found a resting-place in the bed of the stream we follow its course about 10 miles, where it joins the main fork of Squaw Creek coming in from the northeast. The valley now widens and groves of cottonwood line its banks, crossing and recrossing the stream many times; its gravelly bed, free from quicksand, does not delay our trains, and continuing our march for 5 miles, at 11 a. m. we give the stock the benefit of the water, slightly alkaline, found in pools, and of several hours' grazing on the luxuriant grass that grows in the bottom. The Missouri River is but a few miles ahead of us. We see its high bluffs standing out in bold relief, and trace its course some little distance by the thick timber that grows so abundantly in its valley. Some anxiety being experienced for fear that we may have to wait possibly several days for a steamer to ferry the command to the north side of the river, Lieutenant Biddle, Seventh Cavalry, is sent ahead with instructions to hail any passing boat and endeavor to induce it to wait until the command comes up. Soon a messenger returns from that officer with the welcome news that a steamer awaits us—an assurance that we will not be delayed in crossing. Breaking camp we continue our course down Squaw Creek over a fair road, and soon come to the valley of the Missouri, where passing through the rank growth of sage-bushes and underbrush at 7 p. m. we encamp on the south bank of the river, our total day's march being 21.57 miles. Since leaving the Yellowstone we had marched 146 miles, and the miserable water from the alkaline to the strongly alkaline had begun to tell on men and animals, but the refreshing draughts of the pure Missouri River water, served to reinvigorate to restore the spirit and animation, and to relieve the fatigue.

September 24.—We are up early this morning and actively engaged all day in ferrying the train and cavalry across the river. In the angle formed by the Missouri and Musselshell rivers, to the south of the former and east of the latter, is an upheaval of nature terrible to contemplate for military purposes—the high sterile bluffs separated by deep gorges, ravines, and gulches, worn by waters coursing through the loose soil until canons are formed; and through this kind of a country we must needs find a pathway for our pack animals. Starting at 7 p. m. in the darkness, after considerable trouble we find a buffalo trail and follow its crooked windings, balancing ourselves on the precipitous side of a bluff, at whose base, hundreds of feet below, flows the Musselshell, or ascend the steep slopes of the high banks only to find a steeper declivity awaiting us. However, we soon reached a gravelly ford of this river, about 100 yards in width and 18 inches deep, some 3 miles from its mouth. Crossing to its left bank, we passed down its valley cut by arroyos and with a heavy growth of sage-bushes; crossed Crooked Creek, and at 11 p. m. reached the Missouri again on the west side of the Musselshell, near its mouth. No odometer could be used, and the estimated distance of our night's march is 8 miles.

September 25.—At 10 a. m. the steamer Fontenelle crossed the pack-train, mounted infantry, and part of the cavalry, to the north side of the Missouri, and skirting the low hills that touch the river at this point we soon reach an opening, growing rich bunch and bottom grass and bordered by large cottonwood. The low-foot-hills to the west incline toward the north and develop into a ridge of high bluffs which offers shelter from the fierce wind blowing from that direction. Here we find our train which was ferried across the river the day previous. For years the Musselshell country has been a favorite hunting-ground for the Sioux Indians, and in their migrations northward they have followed the trail up Squaw Creek, crossing the Missouri near the point where we are encamped.

September 26.—With considerable difficulty and much delay, we succeed in reaching the top of the high ridge, referred to as being north of the Missouri and near our camp of last night; the road is hard and gravelly and the ascents steep. Gradually descending, our course lies about 10° to the west of north and through a beautiful valley one and one-half miles in width, with a fine growth of luxuriant grass, and ranges of low hills on either side. Then moving over the foot-hills of a small divide and encountering not a few arroyos we make camp at 3.30 p. m., having marched a distance of 14.76 miles. Bunch and buffalo grass of a fine quality grows plentifully everywhere, interspersed with the cactus and sage-bush. The latter we use for our fires, there being no wood in camp, and for water the residue of the last rain that we find in a few shallow water-holes, but it barely suffices for the stock. To the northwest the blue outline of the Little Rocky Mountains is seen.

September 27.—Leaving camp at 5.30 a. m., for three miles we pass over a high rolling country cut by an occasional arroyos. The Judith Mountains are here discernible at a distance of 40 miles, and in direction to the southwest of our trail. Our road now leads over a high rolling prairie where the soil is fertile and the grass luxuriant. To the east and west of us, as far as the eye can see, stretches a vast expanse of undulating prairie land, with waving grasses that furnish food for the numerous herds of buffalo and antelope that graze on every side. The course of the South Fork of Fourchette Creek is traced by the occasional cottonwood growing along its banks. We soon reach the creek, and following it up for a mile encamp on its bank. It has clear water, free from alkali, gravelly bottom, is about 12 feet in width, with low cut banks. The camp is admirably situated, and wood, water, and grass are abundant. Distance traveled, 9.10 miles. While our stock is grazing, a few buffalo quietly join the herd, to seek the refining influence of government mules. For fear that they may stampede flock, orders are given to shoot them. This fork of Fourchette Creek heads to the north of camp, and at a distance of not more than 5 miles. Leaving our wagons in charge of the infantry, with instructions to follow our trail in the morning, at 4.15 p. m. we start out with the cavalry, mounted infantry, and pack-train, and for 10 miles pass over a country gently rolling and with the same general characteristics as that passed over during the early part of the day. At this point, 4 miles to the east of our train, two small lakes are seen, the larger of which is probably 500 yards in length, and permanent. The water is clear and pure. Soon we enter the low foot-hills that break from the Little Rocky Mountains, and picking our way through the darkness, at 9.15 p. m. encamp near a few rainwater holes, where grass of a fair quality grows sparsely, and no wood is found. The total distance marched during the day is 24.11 miles.

September 28.—At 6.15 a. m. we continue through the rough and broken approaches of the Little Rocky Mountains, and shortly after leaving camp came to the Dry Fork of Beaver Creek, with alkaline running water and miry bottom. In its narrow valley no timber is seen, and the grass, though fair, is choked by the growth of cactus and sage-bushes. Taking its rise a few miles to the west of our trail, its course is northeast to its junction with Beaver Creek. Our road now leads through a high rolling country, and at 9.30 a. m. passes by a small lake of clear water, free from alkali, about 1 mile in length and half as wide. The flocks of duck and geese that circle above it find a resting place among its tall grasses. We cross a fine stream of running water, the South Fork of Beaver Creek, and enter a fertile valley between the Little Rockies and a high ridge to the east, on the summit and sides of which the gnarled roots of tall pine trees spread under and over the huge masses of detached rock, and anchor their trunks securely in the most exposed and perilous situations. We halt here a few hours that the stock may graze on the buffalo and bunch grass that grows luxuriantly in the valley. Continuing our march we reach the foot of the Little Rocky Mountains, which, rising to the height of nearly 1,000 feet, impress all with a lavish display of grand and imposing scenery. The whitish precipitous rocky face of the range, checkered by the sunlight and shadow, is relieved by the warm gray lichens which cover it in spots, and the sparkle of tiny streams of water that trickle down its surface. The hardy pine crowns its summit and flourishes in the grand solitudes and silent wilderness of the comparatively unknown region. To these forests we are indebted for the clear cool spring-water that everywhere is found here in the streams. They attract and condense the passing clouds, and gather up the fleeting vapors until from bough and branch they fall in fertilizing drops, are absorbed by the humid, mossy, soil, and accumulating in secret springs and reservoirs, go forth through valley and glen to fertilize. Stretching toward the north is a fine low rolling country, rich in grass, which reaches to the British possessions, 60 miles distant. Milk River, well timbered, flows eastward through the expanse, and is about 25 miles from our trail. This is probably an exceedingly fertile section of country, and would furnish pasture for large herds of cattle. It is certainly a favorite grazing ground for buffalo and antelope, vast herds of which are seen in every direction. At 3 p. m. we cross the North Fork of Beaver Creek. No timber is seen along its banks, and over its gravelly bed flows the clear spring-water that comes from the mountains. Our trail still clings closely to the northern side of the Little Rockies, and at 4.10 p. m. we cross People's Creek; it has a gravelly bed, running spring-

water, but no wood in sight. Passing over several small branches of this creek which wind among the foot-hills of the mountains at 6 p. m., after a march of 28.36 miles, we finally encamp on one of them near the gap or pass of the Little Rockies that tower above us. This pass is the only one through these mountains, and not a little difficulty is experienced in following its intricate windings. The weather to-night is much cooler.

September 29.—Our camp last night was near the northwest extremity of the Little Rockies. Starting long before sunrise this morning we move over that rolling country situated between these last named, and the Bear's Paw Mountains, and cross several small branches of People's Creek, with running spring-water, gravelly bottom, and no timber. Plenty of deer, buffalo, and antelope are seen. At 11 a. m. we came to two small lakes, respectively one-half and one-eighth miles in length, and half as wide. They are shallow, probably permanent, and have clear water, not alkaline. Nearly opposite these lakes, and a short distance from our trail, stand out prominently Medicine Buttes, called by some Three Buttes; several hundred feet in height, they command a fine view of the surrounding country. Ascending the steep side of the highest, and clambering over and among the detached masses of loose trap rock, the top is finally reached, and the fine view obtained well repays one for the fatigue undergone. The Bear's Paw Mountains are plainly seen stretching toward the southwest and the Little Rockies, a little east of north, to the northeast, and, many miles distant, the dim outline of Wood Mountains in the British possessions are seen on the horizon.

Continuing our march over a rolling country, we encamp on a small branch of People's Creek, with clear running water, and no timber in sight. The weather has grown colder, and the storm, which yesterday threatened us, has arrived, snow to the depth of several inches covering the ground. Before starting out on this campaign, the colonel commanding selected as his objective point the Bear's Paw Mountains, and then hoped to strike the hostile Nez Percés Indians, endeavoring by a flank movement from the Missouri River to surprise them on their march northward. Our camp lies concealed in the foot-hills of these mountains, and scouts are sent out in every direction with instructions to find, if possible, the trail of the Indians, and to be circumspect. The distance marched to-day is 25.76 miles.

September 30.—At 4.40 a. m. we break camp and move through the low foot-hills of the Bear's Paw, crossing several small branches of People's Creek, and at 6.30 a. m. halt for a few moments on the principal branch of this stream. It is about 10 feet in width, with clear running water and gravelly bed. No wood is seen along its course. The Bear's Paw Mountains differ from the Little Rockies in many respects. In appearance the latter seem like one huge mass of rock with pine-crowned summits. The Bear's Paw, on the contrary, are mountains of easy slope, separated by beautiful small valleys or glens, and covered with a fair growth of grass. Here, too, the pine flourishes abundantly. On the mountain-side occasionally crops out the unstratified igneous rock, granitic and trappan principally. It is particularly noticeable that, among the pines which cover the mountains and in the cottonwood forests of the valleys, the hum of the insect or song of the bird are never heard. All nature is in repose. One seems to be tracing the airy colonnades of some deserted city of the past, which is no longer tenanted by the living, and which, if the spirits of the dead ever frequent it, 'tis without a sound or a murmur. Only is the impressive silence, the solitude, broken in the agony of the storm, when a thousand strange and haunting voices echo through its glades while the grand old trees wrestle with the winds. Soon the trail of the Indian is discovered, leading northward out of the mountains. It is evidently quite fresh, and this fact is confirmed by our scouts returning to report a smoke seen about 6 miles in our front. The cavalry and mounted infantry are quickly ordered forward, and, leaving a guard with the pack-train which is to follow, they dash over the foot-hills of the mountains, anxious to meet the enemy that has made such a long, strategical march in so masterly a manner. At 7 a. m. commences the battle of the Bear's Paw. We find the Indian village on Snake Creek, a clear, running-water stream, with gravelly bottom, and about 15 feet in width. Their camp is cut by ravines, which wind among the hills that surround it to the high ground above. Already their chief shows his generalship by taking possession of the highest hills and hiding his families and warriors in the deepest ravines, from which we are met with a most withering fire. Colonel Miles quickly sees and secures the most available points, advantageously disposed with respect to the Indian village. Their pony-herd, captured in the first charge, is in our possession, and the Indians are unable to escape. Our line gradually approaches and surrounds the hostiles, and now we feel assured of ultimately securing as well as punishing them. Our little command, which has suffered so severely during the day, is now called on to bivouac for the night on the picket-line. The darkness, occasionally lighted by the flash of a rifle, is impenetrable. The snow descends, it hails, then freezes. There is no wood obtainable within 6 miles, consequently we have no fires to relieve the cold or dry the stiffened, frozen garments of the men, who endure suffering with fortitude. "Prudence," it is said, "is the mother of safety." We can compel a surrender by besieging the hostiles, thereby saving many valuable lives, while we await the arrival of the train which was left on Fourchette Creek to

follow after us. Rifle-pits are thrown up to cover the men, two pieces of artillery are brought into active use, and for four days we keep up our investiture, when, finally, on the 5th of October, Chief Joseph surrenders to Colonel Miles, and with him more than 400 hostile Nez Percés. A visit to their camp shows how destructive has been our fire. The ravines running through the camp were a perfect network or honey-comb of scores of deep excavations, where were concealed the Indians, secure from everything except a plunging fire. On the hills around their village they had erected rifle-pits in the most approved manner, and here they had concealed their sharpshooters. To effect all this work with only the rude implements that they had at their disposal must have required necessarily a very great amount of labor, and it is quite surprising that they should have taken such good advantage of the natural features of the ground, for a civilized enemy could not have done better. For fuel they had burned their lodge-poles. The Indian camp was moved a few hundred yards nearer our own, their rifles and ammunition taken from them, and they were placed under surveillance. After the battle is the peaceful grave, and many a brave soldier who sleeps beneath the sod will long be remembered by his sorrowing comrades.

October 6.—We remained in camp getting everything in readiness preparatory to an early start on the morrow. Wagons are sent to the mountains to collect long poles that mule litters might be constructed for the transportation of wounded soldiers and Indians, and many of them, rude but comfortable couches, were made during the day.

October 7.—We start about noon, after considerable trouble in getting our promiscuous outfit ready, and passing a few miles to the left of our old trail gradually converge toward it until camp, when it is only a few yards distant. By easy marches we reach the Missouri River October 13 at the point where we crossed it coming out, passing over a slightly-rolling country, a little north of our old trail, in order that our wounded on the trains might be made more comfortable. Here steamers were in waiting to convey us across the river.

October 14 and 15—Were utilized in crossing the command, the Indians and their paraphernalia to the south side of the Missouri. The more aggravated cases among the wounded were sent down the river by steamer to Forts Buford and Lincoln.

October 16—Was commenced the journey homeward. Passing over or near to the trail made coming out, and through a country with the same general features and characteristics as that described heretofore until October 22, when passing down the principal branch of Sunday Creek we find a road over hard, comparatively level ground growing rich bottom bunch and buffalo grass, and touching the bad lands that are west of this stream, finally encamp in the valley, where water in pools, good grass, and plenty of wood are found.

October 23.—Continuing down the valley 3 miles from camp we pass over camping place of September 18, and finding here our old trail, follow it into the cantonment, mouth of Tongue River, Montana, which we reach at noon. The lodges of the surrendered Indians are placed in a grove of cottonwood on the south side of the Yellowstone under the watchful care of the military. After a total march of 518.45 miles in twenty-five marching-days, the crossing of two large rivers—the Yellowstone and the Missouri—and the surmounting of many obstacles by indomitable energy and perseverance, the Nez Percés campaign is thus brought to a successful termination.

EXAMINATION FOR A WAGON-ROAD THROUGH LODGE POLE CREEK VALLEY.

While the command continued on the old trail from the south side of the Missouri, on its return from the Nez Percé campaign, I was detached with a squad of cavalry with instructions to proceed to the Musselshell River, follow it to the mouth of Lodge Pole Creek, and then continuing up the valley of this stream, examine it and the country adjacent, with reference to the practicability of a wagon-road being constructed through its valley, and if it would be preferable to the route through Squaw Creek. The notes taken on this occasion are appended in brief, and the time given is by horse.

October 16.—Left camp at 10 a. m., and at 11.15 came to first crossing of the Musselshell; then passed through the river bottom covered with sage bushes, but little grass; crossed several small coulés and through the timber that lines the banks of the river; no trouble experienced except in removing logs and cutting willows. Up to 2 p. m., forded the Musselshell four times; all crossings gravelly bottoms, approaches sloping and good, water from 12 to 18 inches in depth; no work required. Valley of river about 1 mile in width, with high pine-covered ridges on either side, and along its bank abundant large and small cottonwood and willow. The crossings of the Musselshell are rendered necessary by abrupt bluffs meeting the river. At 1.30 p. m., crossed Cat Creek, a western branch of the river; one bank must be cut for wagons, the other sloping; bottom of the creek gravelly in places and dry. Up to 1.30 p. m., we had traveled 12° south of east, then cut across a bend of the river for two miles, 18° south of east. Road certainly practicable to the mouth of Lodge Pole Creek, with little or no work necessary. No quicksand at crossings. Started at 3 p. m. after having stopped an hour to graze the animals at the mouth of Lodge Pole Creek. This creek is an east-

ern branch of the Musselshell and joins the latter at a point 16 miles from its mouth. Lodge Pole Creek has its head near that of Squaw Creek, the breaks of the two interlocking. Crossed the former ten times before 4.30 p. m. Valley of the creek one-eighth mile wide; bluffs on either side clothed with pine and from 100 to 300 feet in height, water in creek highly alkaline, running and probably permanent, plenty of cottonwood continuously met with in valley of creek, pine in hills and ravines; creek very winding with considerable quicksand in places; good gravelly crossings with sloping banks easily found, no work necessary; one could meet with a short distance from camp where two hours' work will be sufficient to make a good crossing; much sage brush and cactus in valley of creek, interspersed with a poor quality of bunch, bottom, and gama-grass growing sparsely; several places met with in the valley the character of the soil of which would render it heavy in the rainy season. The appearance of the bluffs would indicate that the creek during the spring months would be considerably increased in volume and velocity, and would probably be quite impassable. From 2 till 4.30 p. m. our course is 35° south of east, and during that time we probably marched 6 miles. From this time until camp, 5.15 p. m., still continued up the principal branch of Lodge Pole Creek, crossing it six times. The valley gradually narrows to 200 yards in width, plenty of pine in bluffs and drift cottonwood distributed along the valley; grass in valley continues poor. Creek about 40 feet in width and very winding; has low-cut alkali banks; cannot follow its sinuosities by reason of cut bluffs meeting the stream, hence the numerous crossings. Soon after sunset, 5.15 p. m., made a bivouac for the night. Estimated distance traveled during the day is 25 miles. Thus far the route passed over during the day has been practicable for a wagon-road and preferable to that up Squaw Creek. However, during the spring months travel would be delayed by high water. This probably would also obtain in Squaw Creek Valley. Plenty of buffalo, elk, deer, and antelope seen.

October 17.—Sunrise this morning at 6 o'clock, at which time we started, and for 6 miles continued up Lodge Pole Creek, the compass reading 42° south of east, crossing the creek eighteen times in this distance. The creek is very winding and valley narrow, but crossings are over the gravelly bed and but little work required to make them passable. At 6.50 a. m. passed a permanent spring of clear water not alkaline. For two hours after leaving camp no cottonwood in the valley of creek, but some pine on the hills. From 8 a. m. for five miles we travel 40° north of east. At 8.30 a. m. we reach the forks of the creek, the principal branch of which comes from the southeast. The valley is somewhat wider than the one we traverse, has plenty of cottonwood, permanent alkaline water, good bunch, bottom, and gama-grass, and far as can be seen up to its valley would be practicable for a wagon-road. We followed the other or northern fork which winds through low hills to its head, passing several coulees where some work would be required to make good crossings.

From 9.30 a. m. for 8 miles our compass read 26° north of east. We pass a prominent butte close to our trail on the left. At 10.45 a. m. we arrive at the head of the branch of the creek we are following, compass reading 64° north of east, and passing through one and one-half miles of bad land—the first we have encountered—we continue for 5 miles over a rolling country cut by arroyos, and gradually ascend to the top of a high ridge, from which point we discover the command we left yesterday winding over the hills some 5 miles distant. To reach them our course lies 25° south of east and passes over several ridges of easy slope and through the intervening valleys where good grass grows abundantly. The water in Lodge Pole Creek although strongly alkaline, is probably permanent. Even at its head it is found in pools.

The country moved over to-day would admit of a wagon-road being passed through it with but little work at the crossings of the creek or coulees, and without necessarily passing through the small strip of bad land referred to. At 3.20 p. m. we meet the command, and continuing with it for 7 miles arrive in camp on a branch of Spring Creek, having marched a distance of 33 miles.

The route up Lodge Pole Creek to the mouth of the Musselshell would probably be preferable for a wagon-road to that up Squaw Creek, leaving out the consideration of distance, for fewer natural difficulties would be met with and less work required to make a roadway practicable. However, the distance traveled through the valley of Squaw Creek to the mouth of the Musselshell is shorter by one-third than that through the valley of Lodge Pole Creek.

ADDITIONAL.

In addition to the foregoing marches, as acting engineer officer I accompanied the following-named officers, keeping careful itineraries of the route passed over:

Captain Casey, Fifth Infantry, from the cantonment, Tongue River, Montana, to Fort Buford, Dak., February, 1877, over the lower or old trail. Distance marched, 170.88 miles. The return march was made over the same road.

Lieutenant Casey, Twenty-Second Infantry, March, 1877, from the cantonment, Montana, to Fort Buford, Dak., over the upper or new road (short route). Distance marched, 148.70 miles.

Lieut. F. D. Baldwin, Fifth Infantry, April, 1877, from Fort Buford, Dak., to cantonment, Montana. Distance marched, 174.50 miles.

Major Lazelle, First Infantry, June, 1877, made a preliminary survey of that portion of bad land and broken country lying between Tongue River and the Rosebud, with the intention, if possible, of building a road from Fort Keogh to Fort Custer, Mont., thereby saving many miles in distance and two crossings of the Yellowstone River. It was found impracticable, and the idea was abandoned. Distance marched, 98 miles.

A survey made from the site of the cantonment, Tongue River, to Miles City, Mont., is found to be by land 2 miles 540 feet, and by the channel of the Yellowstone River, 2 miles 4,140 feet.

Col. N. A. Miles, Fifth Infantry, July, 1877, cantonment, Tongue River, to headwaters of Cedar Creek, thence to Glendive. Distance marched, 116 miles.

Major Lazelle, First Infantry, in command of portions of the First and Fifth Infantry, and afterward one battalion of the Second Cavalry, moved out from the cantonment, Tongue River, over the country south of the Yellowstone, in the region of the Little Missouri River. Lieutenant Maus, First Infantry, acted as engineer officer. The march of this command is 660 miles.

SUMMARY OF DISTANCES MARCHED.

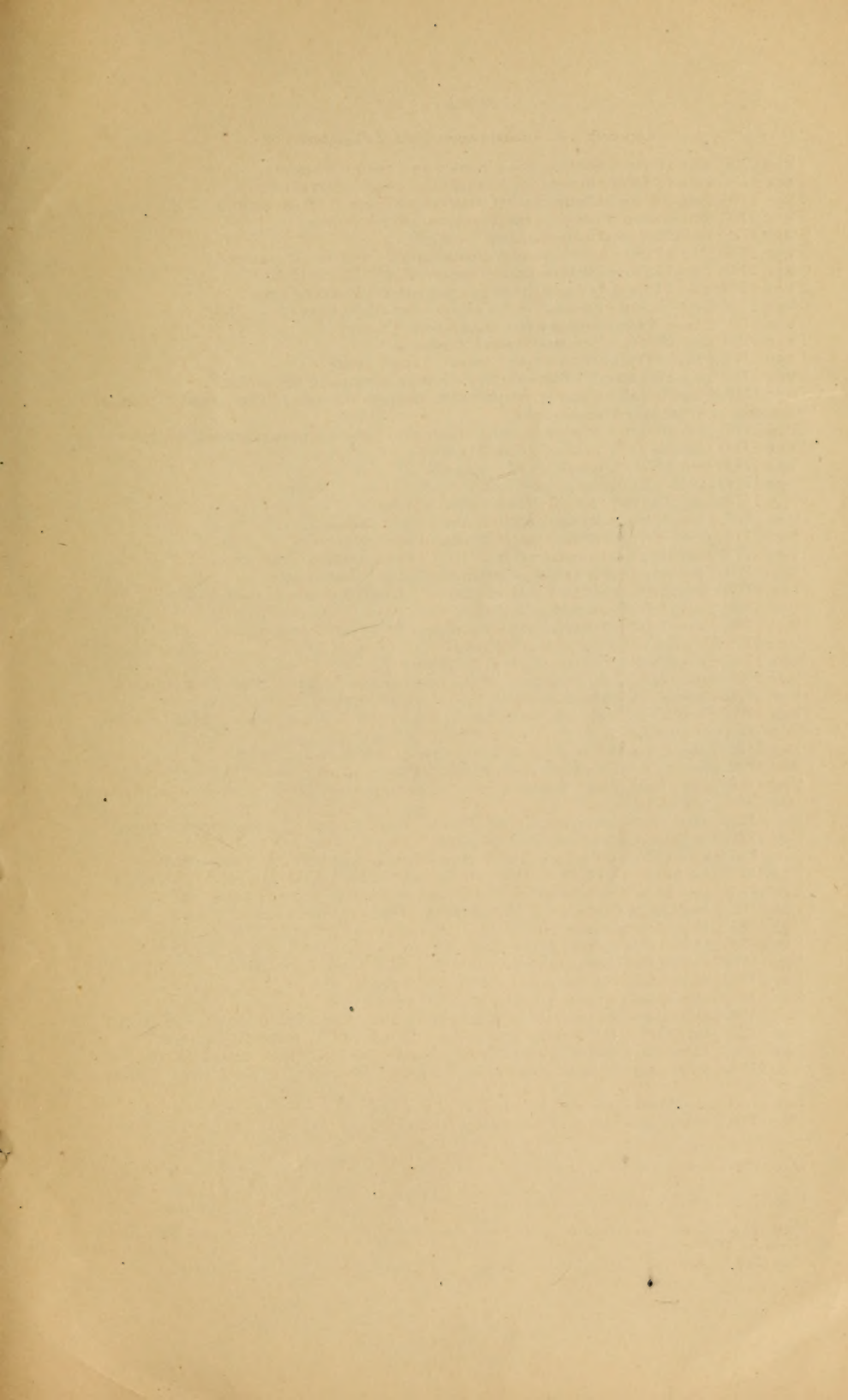
	Miles.
Fort Peck campaign, Col. N. A. Miles, Fifth Infantry, November and December, 1876	430. 13
Wolf Mountains campaign, Col. N. A. Miles, Fifth Infantry, December, 1876, and January, 1877	242. 00
To Fort Buford, Dak., and return, Capt. Jas. Casey, Fifth Infantry, February, 1877	341. 76
To Fort Buford, Dak., Lieutenant Casey, Twenty-Second Infantry, March, 1877	148. 70
To cantonment, Tongue River, from Fort Buford, Dak., Lieut. F. D. Baldwin, Fifth Infantry, April, 1877	174. 50
Lame Deer campaign, Col. N. A. Miles, Fifth Infantry, May, 1877	209. 50
To Rosebud Creek, Major Lazelle, First Infantry, June, 1877	98. 00
To Cedar Creek and Glendive, Col. N. A. Miles, Fifth Infantry, July, 1877 ..	116. 00
To Little Missouri River, Major Lazelle, First Infantry, July and August, 1877	660. 00
Bear's Paw campaign, Col. N. A. Miles, Fifth Infantry, September and October, 1877	518. 50
Lodge Pole Creek, Lieutenant Long, Fifth Infantry, October, 1877	58. 00
Total number of miles	2,997. 09

I am, sir, very respectfully, your obedient servant,

OSCAR F. LONG,

Lieut. Fifth Inf'ty, Act'g Egn'r Officer, District of the Yellowstone.

Lieut. E. MAGUIRE,
Corps of Engineers, U. S. A.



ERRATA.

[Appendix R R, Annual Report Chief of Engineers, 1878.]

- Page 1705, line 20 from bottom, for "recorders" read "readers."
 Page 1705, line 13 from bottom, for "marker's" read "markers."
 Page 1706, line 3 from bottom, for "Observation" read "Observations."
 Page 1707, line 5 from bottom, insert comma after "points."
 Page 1708, line 26, insert comma after "long."
 Page 1708, line 16 from bottom, omit comma after "South Cheyenne."
 Page 1708, line 15 from bottom, omit comma after "Black Hills."
 Page 1708, line 14 from bottom, omit comma after "Beaver Creek."
 Page 1708, line 5 from bottom, for "Valleys" read "valleys."
 Page 1709, line 6, omit comma after "Antelope Valley."
 Page 1709, line 28, for "descent" read "descents."
 Page 1709, line 20 from bottom, for "track" read "tract."
 Page 1710, line 19, after "water-course," change comma to semicolon.
 Page 1710, line 20, for "most, unfrequented, meager streams. The" read "most of the unfrequent, meager streams; the."
 Page 1710, line 26, for "topographical engineer" read "Topographical Engineers."
 Page 1711, line 15, for "valley" read "valleys."
 Page 1714, line 3, for "signal" read "signals."
 Page 1714, table, 3d column, line 6, for "+0.39" read "-0.39."
 Page 1716, line 23, for "(30.15)" read "(30.15 miles)."
 Page 1716, line 6 from bottom, omit comma after "transit."
 Page 1716, line 5 from bottom, omit comma after "adhered."
 Page 1718, line 16, omit comma after "to," "Fort Laramie," and "feet."
 Page 1720, first line below table, omit comma after "barometer."
 Page 1720, line 22 from bottom, after "agree" change comma to semicolon.
 Page 1720, line 18 from bottom, for "0.5 or 10" read "0, 5, or 10."
 Page 1720, line 17 from bottom, for "example: In" read "example, in."
 Page 1722, line 2, for "ring" read "King."
 Page 1722, line 6, for "altitude" read "altitudes."
 Page 1725, first table, last column, line 3, omit semicolon after "Fort Fetterman."
 Page 1726, first table, 3d column, line 3, for "20.99" read "20.29."
 Page 1726, first table, last column, lines 3 and 4 from bottom, omit "Road follows creek to next crossing."
 Page 1726, second table, 2d column, line 4, for "16.03" read "10.03."
 Page 1726, last table, 1st column, line 3, for "(Chug Lpring)" read "(Chug Spring.)"
 Page 1726, last table, last column, line 3, insert period after "Creek" and omit comma after "Junction."
 Page 1726, last table, last column, line 3 from bottom, omit "An excellent spring."
 Page 1732, first table, last column, line 5, for "8' x " read "8' x 1'."
 Page 1732, first table, 3d column, line 3 from bottom, for "92.9" read "92.79."
 Page 1733, first table, 3d column, line 7 from bottom, for "5 37.91" read "-5 37.91."
 Page 1733, last table, 6th column, line 4 from bottom, for "27.89" read "27.87."
 Page 1735, heading to table, for "Where sent" read "When sent."
 Page 1735, table, 5th column, line 3, for "26.18" read "26.21."
 Page 1735, table, 5th column, line 6, for "29.10" read "29.8."
 Page 1735, table, 5th column, line 23, for "40 10.05" read "40 00.05."
 Page 1735, table, last column, line 3, for ".78" read ".81."
 Page 1735, table, last column, line 6, for ".70" read ".68."
 Page 1735, table, last column, line 5 from bottom, for "1 26 03.57" read "1 26 03.75."
 Page 1736, last table, 4th column, line 8, for "23 53 06.5" read "23 52 06.5."
 Page 1736, table, 4th column, line 12 from bottom, for "55 06.0" read "55 06.5."
 Page 1739, table, last column, line 12, for "bank first camp" read "bank. First camp."
 Page 1740, table, last column, line 16, for "July 14, 31'" read "July 14, 31."
 Page 1740, table, last column, line 6 from bottom, for "July 11" read "Aug. 11 to 16."
 Page 1742, table, column 5, lines 12 and 13, for "44 09 06.42" read "44 09 06.42."
 Page 1742, lines 2 and 3 from bottom, for "44 10 45.65" read "44 10 45.65."
 Page 1743, table, last column, the brace should include only the latitude of "Fort McKinney, Wyoming."
 Page 1743, table, 5th column, line 12, for "43 59 00.03" read "43 57 00.03."